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AIR FORCE

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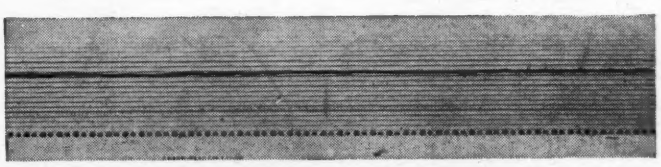
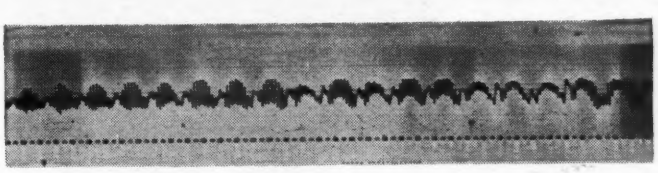


B.F.GOODRICH DISK BRAKE stop is recorded on oscilloscope film. Note smoothness of line during stop.



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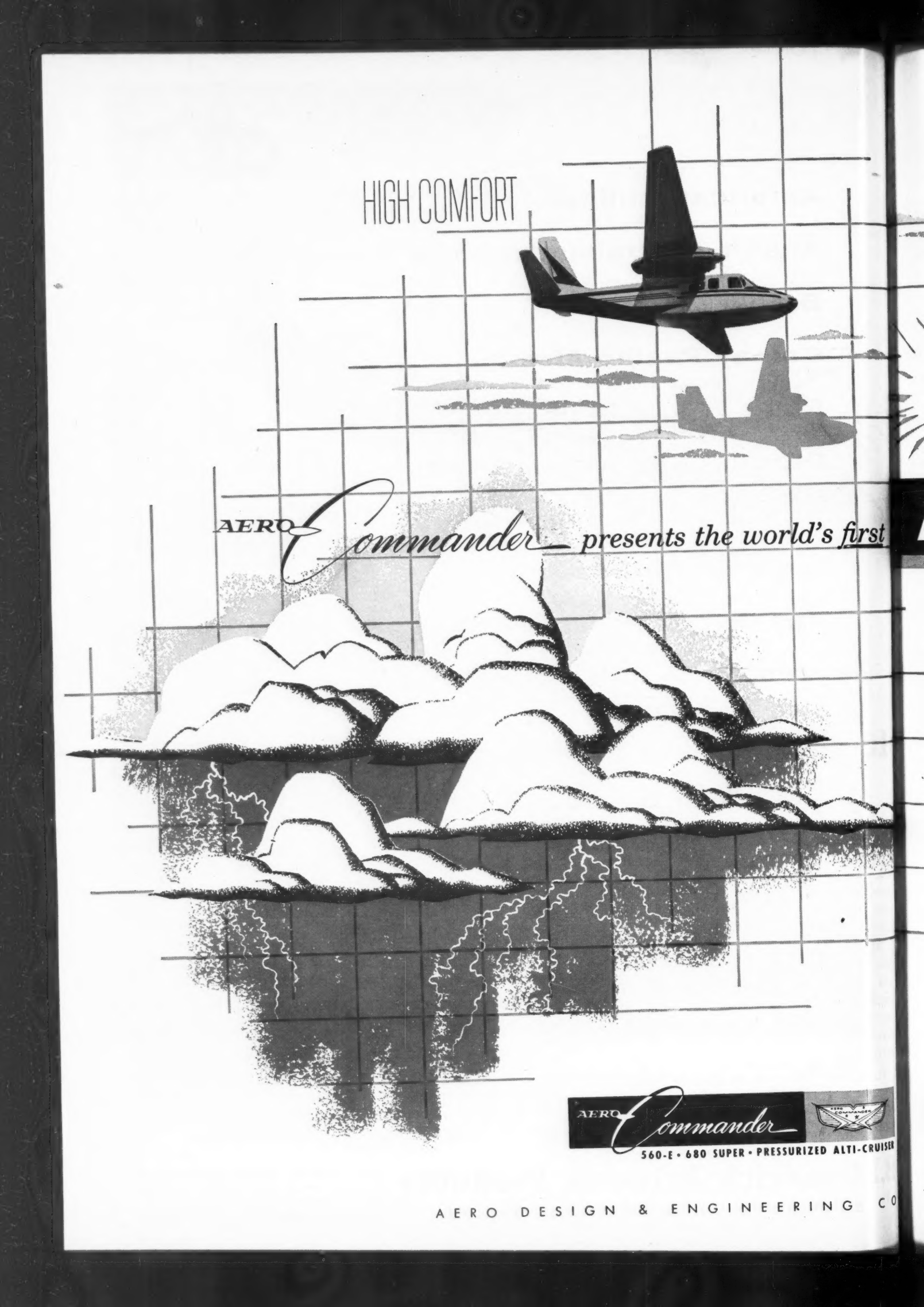
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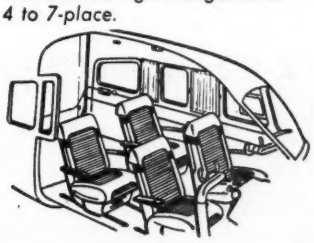

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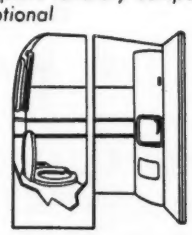

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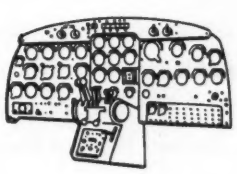

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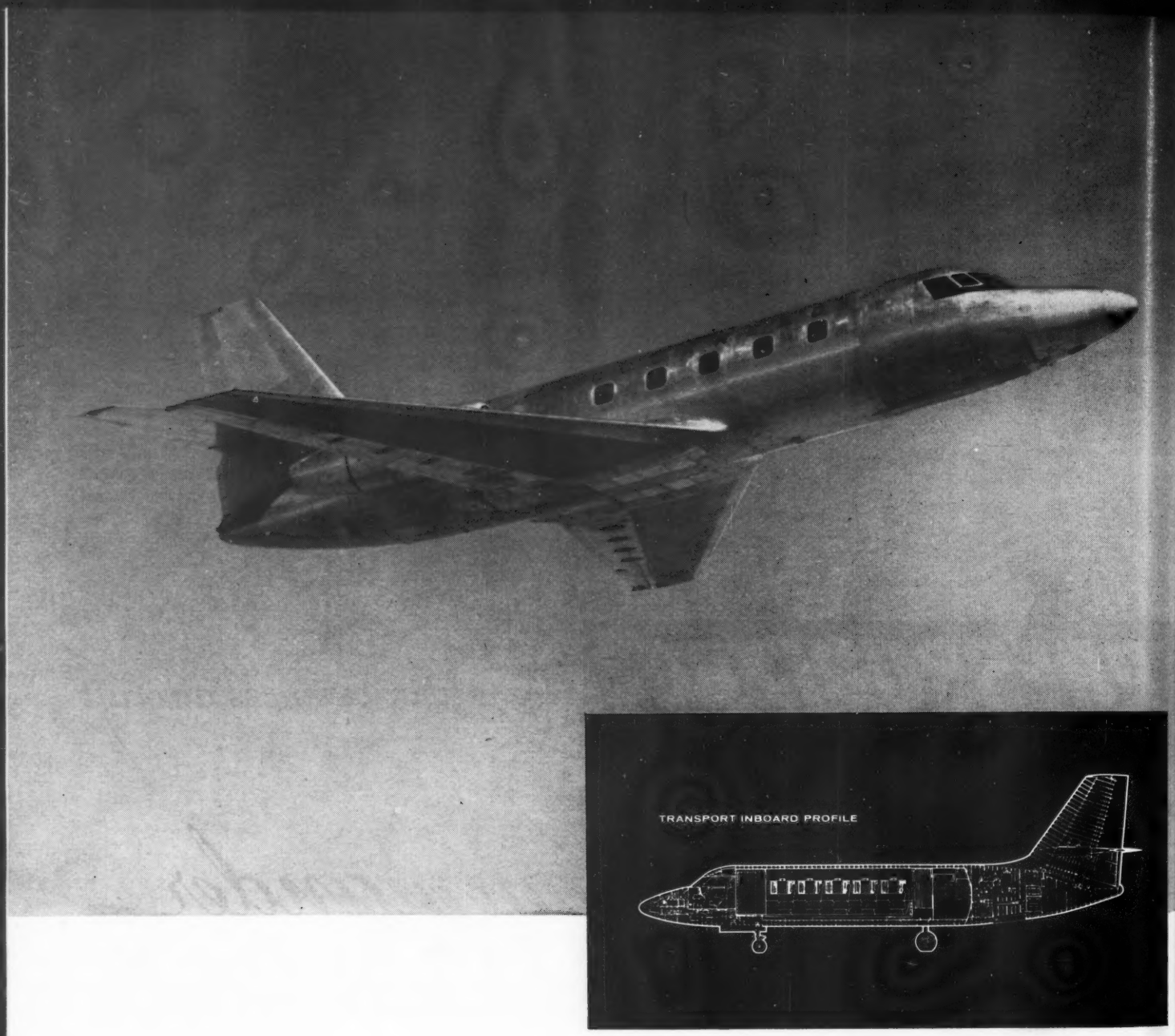

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AIR FORCE

THE MAGAZINE OF AMERICAN AIRPOWER

Volume 41, Number 2 • February 1958

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Is it possible to build a **MAN?**

"Theoretically, yes," said the scientist. "Or a reasonably remarkable imitation—a kind of mechanical analogue. Call it a habit machine, a mechanism operating according to the laws of the conditioned reflex."

You mean that you could actually build a mechanical mind? One that would exhibit emotions —such as love, fear, anger, loyalty?

"We're doing something like that now in advanced missile development," the scientist replied. "In a limited, highly specialized way, of course."

"Take the 'pilot' that is being developed for the big long-range missile. *He* has a wonderful memory, and can solve many complex navigational problems in a flash. *He* loves perfection, and actually becomes highly excited when *he* gets off course. *He's* a tough-skinned character, impervious to the cold at several hundred miles altitude and the incredible heat at re-entry. And *his* loyalty is heroic. *His* life is a single mission, the mission *his* whole life... and maybe ours, too. *He's* a pretty important *fellow.*"

What about the complete man-made Man? What would that entail?

"A mechanism the size of the capitol in Washington, and the best scientific resources in the world. But it could be done. You see, it's only a question of how physical matter is organized. As a great biophysicist explained, 'If material is organized in a certain way, it will walk like a man. If it is organized in another way, it will fly like a missile.'"

Still, wouldn't there be something missing in the complete man-made Man—something very important?

"Yes," said the scientist. "A soul."

MARTIN

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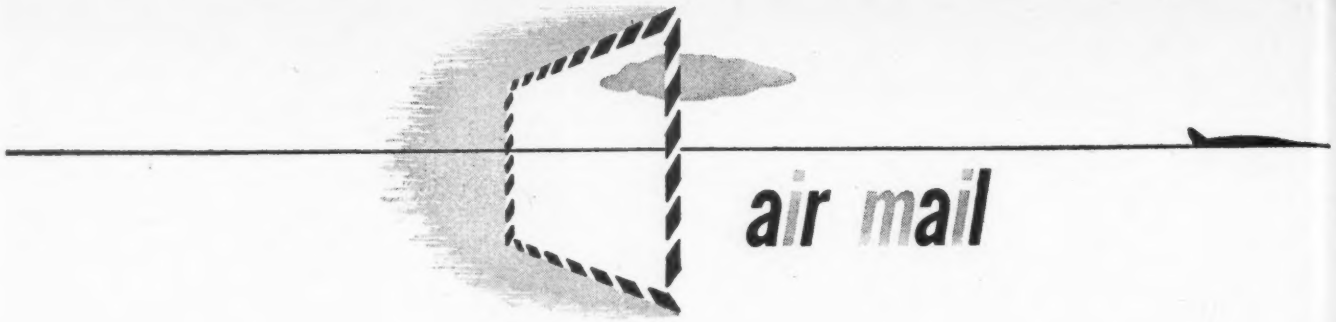


The Technological War

Gentlemen: I have just finished reading most of the articles in the December '57 issue of AIR FORCE Magazine. I do not want to let the opportunity pass without expressing to you the high regard I hold for the editorial staff discussion under the heading "Organizing for the Technological War." Everything considered and on a broad range of coverage, I think this is by all odds the best discussion of the subject which I have seen. I sincerely hope that it will have a salutary effect on those responsible for policy and organization in government circles.

It was interesting that in the same issue of the magazine, the excellent short articles entitled "How Much Time Is Left?" and "How the Soviets Run Their Missile Program" should occur. These fit in very nicely with the basic article first mentioned above.

T. P. Wright
Vice President, Research
Cornell University
Ithaca, N.Y.

Gentlemen: Wonderful job done in your staff study "Organizing for the Technological War" [December '57]. In hopes that more people will read it, I am writing to the editors of *The Reader's Digest*, telling them they should request permission to reprint it.

Maj. Bert Decker
Roswell, N.M.

Wrong Unit

Gentlemen: I wish to point out an error of unit designation in "The Ready Room," published in the December '57 issue of AIR FORCE.

You stated that Col. Benjamin W. Fridge, now new Deputy Assistant Secretary of the Air Force for Reserve and ROTC Affairs, was a deputy commander of the 340th Troop Carrier Wing (Reserve) in California. Colonel Fridge was deputy commander of the 349th Troop Carrier Wing, Hamilton Air Force Base, Calif., *not* the 340th.

I am a member of the 349th Troop Carrier Wing, now assigned with the 349th Supply Squadron, Hamilton AFB, Calif., and have met Colonel Fridge. The Wing was formerly the 349th Fighter-Bomber Wing, until October 1, 1957, then we were converted to Troop Carrier Wing.

Henry W. Chin
Oakland, Calif.

● *The 349th is right. The writer says he's set up an appointment with an oculist.—The Editors.*

Fuel Consumption of AN-10

Gentlemen: When I saw the SFC figure for the turboprop engine installed on the Russian AN-10 transport (AIR FORCE, November '57) given as .27, I thought that the figure should be .72. However, three lines below appears another still lower figure of .21, and now I do not know what to think.

Anybody who is working closely with aircraft engines knows that these figures are less than can be obtained even with our best reciprocating engines and are about one-half of those for the current and proposed turboprops in the same power class.

In this race for more powerful and efficient engines, there are several equalizing factors which affect Russia and us. These factors are:

1. Atmosphere
2. Heat value of the fuel—18,500 BTU per pound
3. Deterioration of strength of metals due to high temperatures, rotational speeds, and pressures.

It is hard to believe that under these conditions the Russians can overtake us by such a great margin.

A. N. Petroff
Cessna Aircraft Co.
Wichita, Kan.

● *Reader Petroff is correct. The specific fuel consumption of the Russian turboprop given on page 86 of the November issue slipped through as an improper conversion out of the metric system. It should have been 0.53 pounds of fuel per horsepower per hour instead of 0.27 as given.*

However, it should be pointed out that the Russians are achieving much lower specific fuel consumptions with their turboprops than Mr. Petroff suggests. The famous "K" turboprop engine, which powers the Russian bomber called Bear by NATO, has a calculated specific fuel consumption at optimum altitude and speed of 0.352 pounds per horsepower per hour. Its actual performance at sea level has been given to us by its German designer as 0.57 pounds per horsepower per hour.—The Editors.

From the Interior

Gentlemen: WOW! Allow me to congratulate you on your August issue with the history of the Air Force. We have read it (my son and I) and reread it and will keep it around to refer to for years to come. How well you portrayed the dark days following Pearl Harbor, which was all news to my boy who is fourteen.

Please forgive the lateness of the hour of arrival of my check, but I am way up in the boondocks and it takes a while for even Sputnik to get up this way. If you have canceled our subscription in the meantime we shall be deeply offended.

I should like to become a member of the Air Force Association. The membership card and lapel pin are all right, but I am warning you that the only thing I have to put the auto decal on is a dugout canoe.

Clemence G. Smith, Missionary
Manaus, Amazonas, Brazil, S.A.

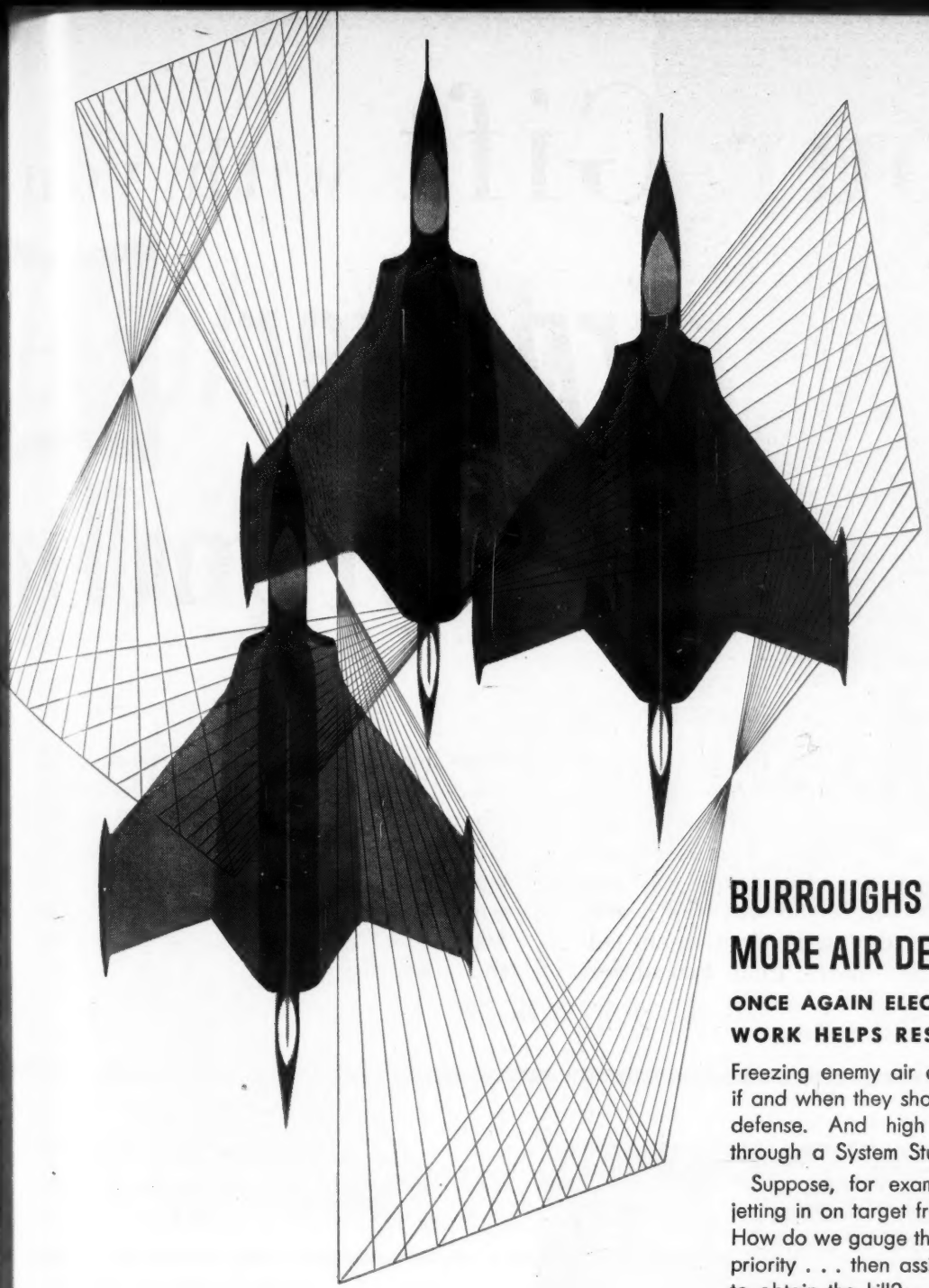
Personal Friend

Gentlemen: Field Marshal Montgomery is in England at the moment and he asked me to reply to your letter of November 12.

General Norstad had already shown him your article ["Death of a Colonel," November '57], which he read with very great interest. I talked to the Field Marshal on the telephone and he asked me to tell you what a good article he thought you had written and which, in his opinion, did full justice to the career of Pat Paul.

Col. Pat Paul was a great personal friend of the Field Marshal's and he was extremely sad to hear of his death.

Lt. Col. A. D. R. G. Wilson
MBE, A & SH
Military Assistant to
Field Marshal Montgomery
Paris, France



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"I commend this volume to all who have a deep and abiding interest in American airpower . . . to those who support Air Force activities in other capacities. It is a proud chronicle of the past and a valuable tool for the future."

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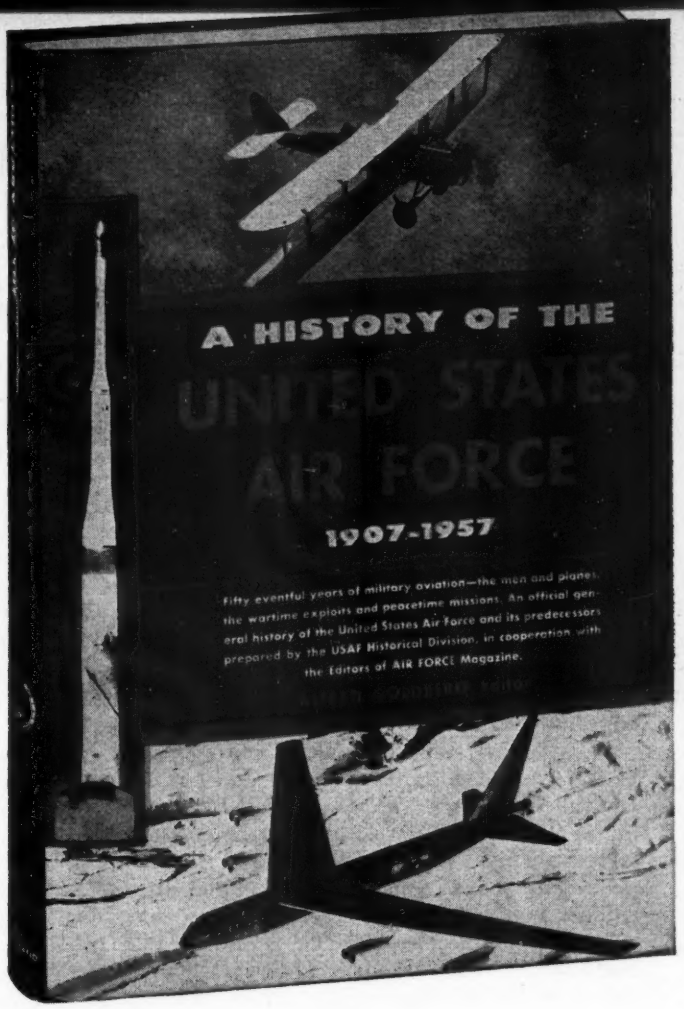
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airman's bookshelf

Sir Francis Bacon said, in his essay "Of Studies," "Reading maketh a full man, conference a ready man, and writing an exact man."

"Reading," says the brilliant British Air Chief Marshal Sir John Slessor, ". . . well, you really cannot think intelligently except against a background of knowledge, knowledge of what has been done in the past as a guide to what may be done in the future, knowledge of what other people, whose opinions may be worth having, think about things." And he admonishes, "Read as much as you can of the history of the late war and events since 1945 . . . about current affairs . . . read critically . . . don't take others' opinions for granted—read with the question in the back of your mind, 'Now—is this really so, do I agree with this? And if not, why not?' It will help you fix in your mind what you read, help develop your own ideas, broaden your knowledge."

Slessor's own new book *The Great Deterrent* (Praeger, $7.50) is a good starter in that kind of reading. In it he has collected major articles and lectures given at civilian universities and military war colleges in Europe, Canada, and the United States. They deal mainly with strategic policy and international relations in the nuclear air age, and are aimed at younger career military officers. With the exceptions of the chapters "German War Plan of 1914," and "The Impact of the Internal Combustion Engine on the British Army," the material is current. His airpower views are not parochial but come from logical argument based on the realities of modern weaponry. Slessor's anthology of his own writings provides a thorough coverage for the student of military science and international affairs, including "Total or Limited War?", "Strategy for the West," "The British View of the World Strategic Situation Today," "The Policy of Deterrence," "Geneva, Disarmament and Security," and "Airpower in War." The articles appear as originally written, even though Slessor admits some of his views have changed with time. This is detectable and he says, "If a man can't change his mind, the chances are he has not got a mind to change." Thus Slessor reflects a characteristic peculiar to airmen through the years—a willingness and ability to change with and adapt to military reality.

* * *

Another vital book for the professional airman and student of military science is Henry A. Kissinger's *Nuclear Weapons and Foreign Policy* (Harpers, $5)—called by some critics the most important book of 1957 (*see "Strategy and Organization for the Nuclear Age,"* AIR FORCE, *May '57*). In conjunction with the Council on Foreign Relations, Kissinger worked with a distinguished panel of high-level military and civilian experts appointed "to explore all factors involved in the making and implementing of foreign policy in the nuclear age." His book, essentially the product of the panel's deliberations, explores and analyzes the many-faceted impact of nuclear weapons upon military strategy

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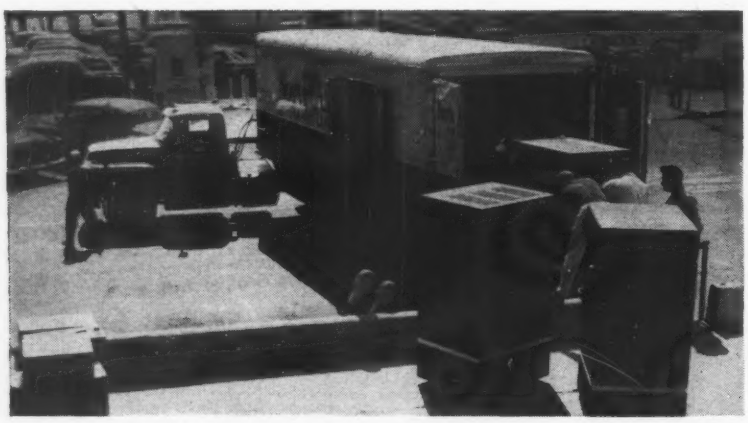

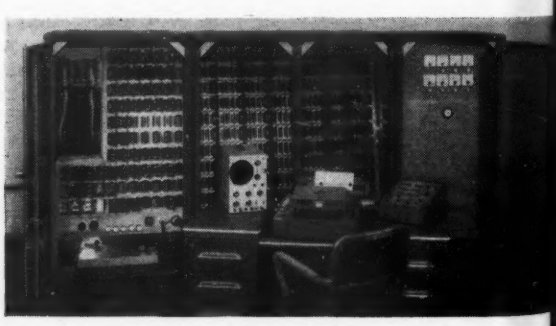

Left—Alwac, electronic digital computer, loads *uncrate* into padded van at manufacturer's West Coast plant. **Right**—North American's fast, safe service—door-to-door—has customer's unit in operation ahead of schedu

DOOR-TO-DOOR DELIVERY . . . UNCRATED . . . HIGH-VALUE PRODUCTS . . . EXHIBIT DISPL

and foreign affairs. He enumerates inadequacies of our current military force structure and strategic military doctrine and, in the current debate on military reorganization, Kissinger recommends two "self-contained" forces: a Tactical Force and a Strategic Force to cope adequately with limited and total war. Each would be made up from components of all three services, the services themselves remaining with primary functions to train personnel for the combat forces. "Such a division," he maintains, "would reflect the realities of the strategic situation."

It is the most thorough public examination of the obscure relationship of military strength, weapons, and strategy to international political objectives that has appeared in recent years, and it has been much in demand in Pentagon offices.

* * *

A masterfully researched and written objective study of the role and relationship of the military man in American society is *The Soldier and the State*, by Samuel P. Huntington (Harvard University Press, $7.50), a careful look at civil-military relationships that does *not* show the traditional anti-militaristic spirit.

On the contrary, Huntington, professor of government at Harvard, refutes the belief that the military is a danger to our way of life, and he stresses the importance of the military man to the community, marking him a professional entity no less than the clergy or the law.

* * *

Why Hitler never invaded England in accord with his specific Directive No. 16, dated July 16, 1940, is told in *Operation Sea Lion*, by Peter Fleming (Simon and Schuster, $5). "Sea Lion," the Wehrmacht's code name for this proposed military venture, might have succeeded had it not been for the airpower—the RAF's gallant fight in the skies over England, the Channel, and Coastal France—and the German High Command's overestimation of British strength. Of course, "Sea Lion" was never mounted at all, or even attempted in practice. On October 12, 1940, just three months after invasion orders were issued, Hitler canceled out. The Luftwaffe could not control the air over the invasion route. Improper Luftwaffe air planning, and the shifting Nazi air attack from target to target without concentrating on the RAF itself or the British radar-control stations, must be charged to the pompous, swaggering, over-confident Goering. And the first decisive battle of World War II was won by the RAF with the help of the whole British nation. The story of the summer and fall of 1940 is brilliantly related by Peter Fleming in the best book yet on this subject.

* * *

The story of the other chapter in the Battle of Britain, the London Blitz, is dramatically told in *The Winter of the Bombs*, by Constantine Fitzgibbon (W. W. Norton, $3.95), writing from official records, personal experience, interviews with London residents (from taxi drivers to housewives to government workers), and former Luftwaffe and RAF veterans. Airmen will find this book an experience at coming to grips with things on the other side of the bombsight.

* * *

US Army Col. Kenneth K. Hansen, former UN Chief of Psychological Warfare during the Korean War, contributes a remarkable case study of the ineffectiveness of Communist ideology and brainwashing in the story of the 88,000 Chinese and North Korean POWs who chose to remain outside the Bamboo Curtain after the Korean Armistice. *Heroes Behind Barbed Wire* (D. Van Nostrand, $5.95) is an extraordinarily well presented inside account of what happened in Koje Island compounds after the Armistice, and

(Continued on following page)

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AIRMAN'S BOOKSHELF—CONTINUED

how the West's handling and treatment of Communist prisoners paid off in exposing the thin façade of Marxism which masks the oriental Red.

° ° °

Len Giovannitti, a 49½ mission veteran navigator of the USAF bomber offensive over Europe, spent the last year of the war as a German POW at Sagan, Germany. His recent novel, *The Prisoners of Combine D* (Henry Holt, $5) is based on his experiences in Stalag Luft III, housing 1,500 captured American flyers. It tells the story of six members of Combine D (a prison camp unit organization) that is climaxed by a forced POW death march in the bitter winter snow in the van of approaching Soviet armies. This is an authentic, realistic, powerfully written story of free men in chains.

° ° °

To complete his series of major military academy picture books (Annapolis, West Point, Coast Guard), Jack Engeman, retired naval officer, now presents his *U. S. Air Force Academy: The Life of a Cadet* (Lothrop, Lee and Shepard, $3.50) (*see pages 48 and 49 of this issue for representative photos*). The book is a picture story of Air Force cadets at work and play, in the classroom, at quarters, on the athletic field, at flying duty, and recreation. It follows the cadets through the fourth class summer field maneuvers and a recent aerial summer trip to Europe. Next fall the Academy will move to its permanent quarters near Colorado Springs. Revision of the book is anticipated then.

° ° °

Suggested addition to the reference shelf of all air libraries, public and private, is a new American edition of a British original *Air Dates,* by Air Commodore L. G. S. Payne (Praeger, $7.50). Billed as a chronological survey of the principal events in military and civil aviation throughout the world (beginning with balloon ascents in 1783 to December 31, 1956), the volume is a little light on American aviation, heavy on British and European. Nevertheless, the "oft called for" key dates are here, and quite often it is the facts of international aviation that are the hardest to find.

° ° °

In the paperback corner:

Breakaway, by Wally Depew (Perma-Books, 35¢). A novel about the non-sked cargo and passenger airlines in the South Pacific and the Orient.

One Minute to Ditch, by Cornelius Ryan (Ballantine Books, 35¢). A collection of five prize-winning articles from *Collier's,* each about moments when men have faced death. Lead piece is the story of the Pan-Am Stratocruiser ditching in mid-Pacific and the heroic rescue of the passengers and crew.

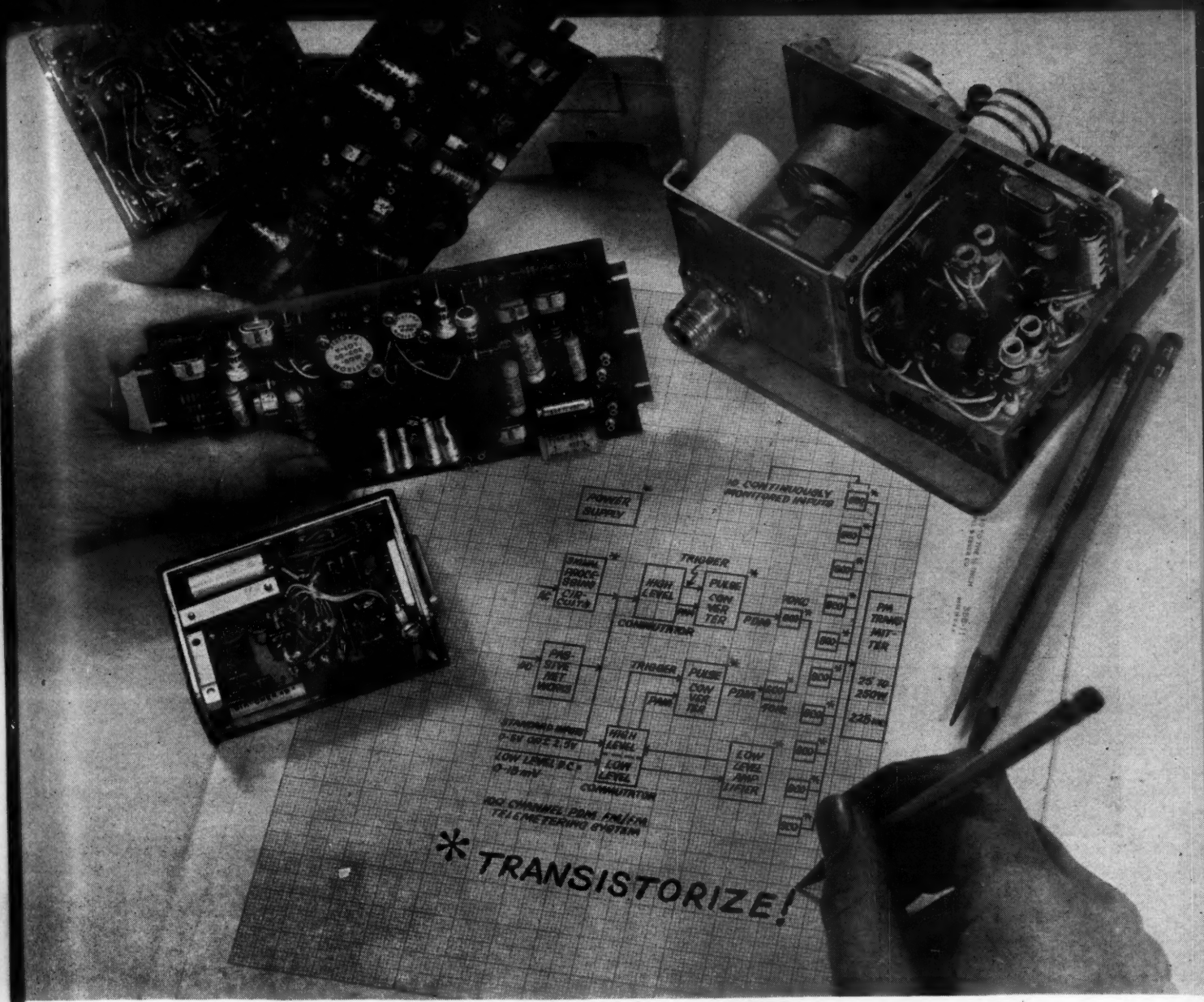
The Bridge at Remagen, by Ken Hechler (Ballantine Books. 50¢). A dramatic, detailed hour-by-hour story of the momentous day the Allies captured the historic Remagen Bridge from the Nazis. Foreword by S. L. A. Marshall, who witnessed the event.

Kamikaze, by Jasau Kuwahara and Gordon T. Allred (Ballantine, 35¢). The personal story of Kuwahara, Japanese suicide pilot (one of the few to survive) and his Japanese Air Force career from 1944 to the end of the war.

Midway, by Mitsua Fuchida and Masatake Okumiya (Ballantine Books, 50¢). The enemy's view of the decisive battle of Midway as related by two former officers of Japan's Imperial Navy.

Bomber Crew, by Joseph Landon (Avon Publications, 35¢). Air combat over the Ploesti oil fields. A novel—original title *Angle of Attack.*

—CAPT. JAMES F. SUNDERMAN



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*TI Pulse Duration Modulation telemetering equipment shown, clockwise from lower left: Sub-Carrier Oscillator; Phase Discriminator; Low-Level Amplifier; Keyer; Single-Package 200-W Transmitter.

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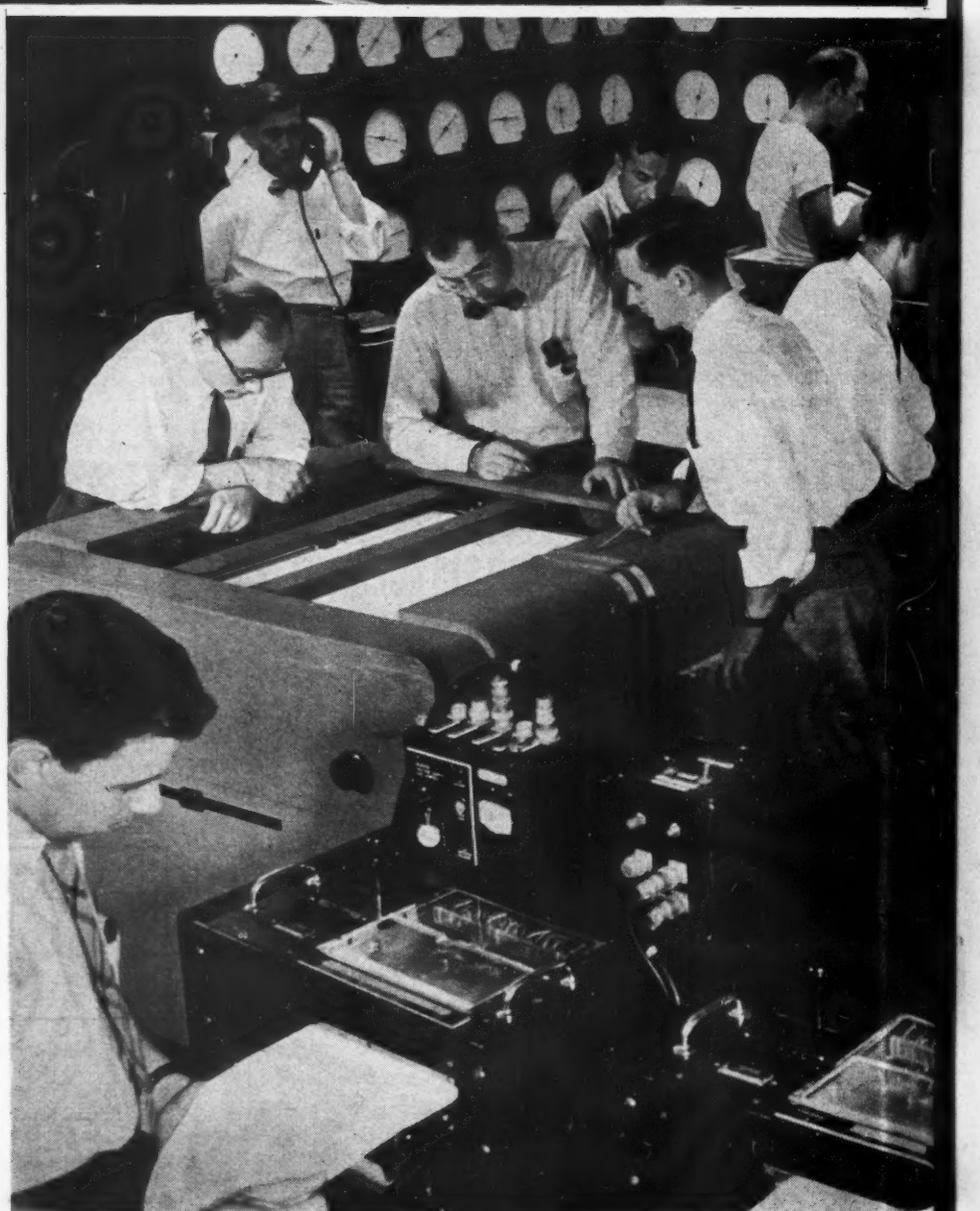


MORE THAN HALF AN ACRE of computers in this laboratory provide answers at lightning speed for Pratt & Whitney Aircraft engineers. Included are four advanced IBM 704 machines. Each has some 30 satellite units.

COMPUTATION LAB

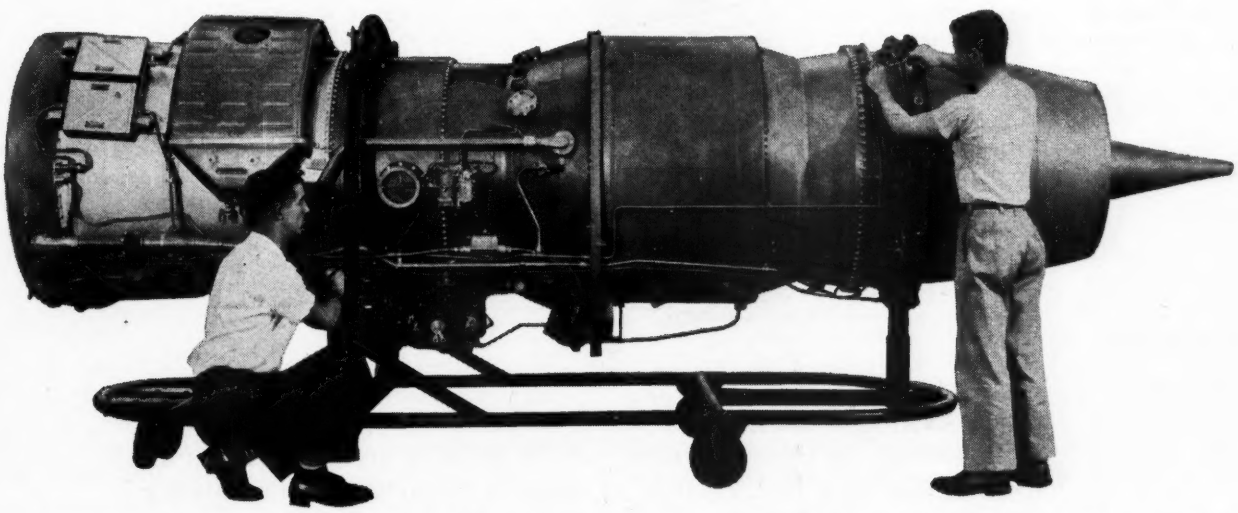
. . . A Matchless Tool to Advance the Engine Building Art

Engineers at Pratt & Whitney Aircraft have many matchless tools and facilities to call upon. One of them is the Computation Lab, the largest industrial installation of new electronic data processing equipment in the United States.

In an air-conditioned building at United Aircraft's Research Department, four giant IBM 704 computers, and other data processors, are now in full operation. They compress years of engineering effort into hours. Each 704, for example, is capable of performing about 2 million calculations a minute.

With these advanced calculators, it is possible accurately to predict performance of a complete engine through the whole range of operating conditions. Theoretical engines, too, can be tested mathematically, to provide knowledge practically unobtainable without computers. For more advanced problems, computers perhaps 100 times faster than the 704 are being developed.

Electronic computers had a major part in the design and development of Pratt & Whitney Aircraft's widely used J-57, and the J-75, most powerful jet engine in volume production. The electronic marvels of the Computation Lab, and many other advanced engineering facilities, will be even more important in future years in the design, development and production of the world's best aircraft power plants . . . in whatever form they take.



P&WA J-75, shown above, is the first engine to have guaranteed altitude operating performance. It owes much of its design superiority to the work of electronic computers.

Pratt & Whitney Aircraft

Division of United Aircraft Corporation, East Hartford, Connecticut

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COMPONENT, PRICELESS, AIR FORCE . . . an Air Force pilot is an investment in time and money which must be protected. He is an irreplaceable link in the chain of defense upon which our nation's security rests. But to the United States Air Force a pilot is more than a set of dog tags. He's your wing man . . . your buddy in the next bunk . . . a priceless member of your team. He deserves, and gets, all the protection the United States Air Force can provide. One new way will be with Kaman H-43 crash rescue helicopters . . . on the alert anytime . . . anywhere.

THE *KAMAN* AIRCRAFT CORPORATION

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What's New With ★ RED AIRPOWER

Here's a summary of the latest available information on Soviet air intelligence. Because of the nature of this material, we are not able to disclose our sources, nor document the information beyond assurance that the sources are trustworthy.

The information which follows, on Russian ballistic missiles development, has been assembled with great care and effort. All of it comes from AIR FORCE*'s own sources, and it is presented as the "best available" information at this time on Soviet long-range missile progress. Admittedly the information is not as up to date nor as complete as* AIR FORCE *would like.*—THE EDITORS.

Russia is spending the equivalent of $4 to $5 billion per year on the development and construction of guided missiles of all types, compared to something less than $2 billion for the United States in 1957.

* * *

The Russian T-1, once designated the M-101, is a single-stage rocket, an evolutionary development from the German A-4. It is used by the Red Army, but also by the Red Navy from submarines. It is about fifty feet long and has a diameter of about five feet, four inches.

The T-1 is propelled by a liquid rocket engine that develops a thrust of 77,000 pounds. Top speed is 4,900 mph, and range is about 450 miles. It normally reaches an altitude of 110-120 miles.

* * *

The Russian T-2 missile, once designated the M-103, is a two-stage affair. The T-1 forms the second stage, and, like the latter, the T-2 can be launched from a submarine. This missile already has been established in East Germany and Czechoslovakia. Some 20,000 have been built.

The first stage has a liquid rocket engine with a thrust of approximately 275,000 pounds for 125 seconds. Total length of the unit is about 125 feet, and the diameter at the largest point is about fifteen feet.

The two-stage missile weighs ninety to ninety-five tons at takeoff, of which all but 7.5 tons is fuel. It reaches a top speed of 10,000 mph (second stage) and has a range of about 1,800 miles.

* * *

The T-3, formerly the M-104, is still in the testing stage. It is either a two- or three-stage missile, of which deliveries to the Army are yet to get under way. However, the T-3 is designed to carry a hydrogen warhead, and several test firings have been carried out. It has a launching weight of about 250 tons, and achieves a maximum speed of 15,000 mph with a range of 5,000 miles and gets to an altitude of about 900 miles.

The T-3's first-stage liquid rocket is reported to develop a little more than 800,000 pounds of thrust.

* * *

The T-3A is either a three- or four-stage rocket developed for the satellite or *Sputniki* programs. It consists of T-2 or T-3 units.

* * *

The Soviet Comet I missile, a ballistic type, uses solid fuel, thereby reducing the logistics problem. Now in mass production, it was designed for use from submarines and may be launched under water. It has a range of 600 miles and achieves an altitude of about 160 miles.

* * *

Comet II missile, formerly the M-102, is a development from the Comet I. It is similar to the US Army's Redstone, except that it also may be operated from submarines. It has a length of about fifty feet, achieves a speed of 6,000 mph, and has a range of 700 miles.

* * *

The T-4, a winged rocket developed from the T-1, is now in production. This missile has a glide characteristic which enables it to be controlled near the end of its flight as it is passing through the heavier layers of air.

The engine develops 77,000 pounds of thrust, and is the same power plant as for the T-1. However, the T-4 has twice the range of the T-1, thanks to the wings, and thus can be used against targets up to 900 miles from the launching point.

* * *

The T-4A has been designed to carry forward the original idea of Eugen Sänger for an antipodal bomber, a rocket plane that would be shot up well above the atmosphere and could then glide or "skip" a great distance as it reapproached the earth.

Such a craft would be manned, and, according to Sänger, could cover 10,000 miles in about seven to nine skips off the heavier layers of the atmosphere, much as a flat stone can be skipped on water.

The Russians employ a powerful booster rocket on rails to launch this unit, which consists of two additional stages, the final one with delta wings and a relatively small rocket engine.

The third or last stage is sixty-eight feet long and is propelled by three liquid rocket engines.

Just how far the Russians are with their glide bomber is not known, but there have been a few indications that they will launch it before 1960.

* * *

In addition to the above rocket-powered equipment, the Russians have a couple of long-range, air-breathing missiles. One, designated the J-2, is subsonic and has a range of about 700 miles. It can be operated from submarines as well as from the ground.

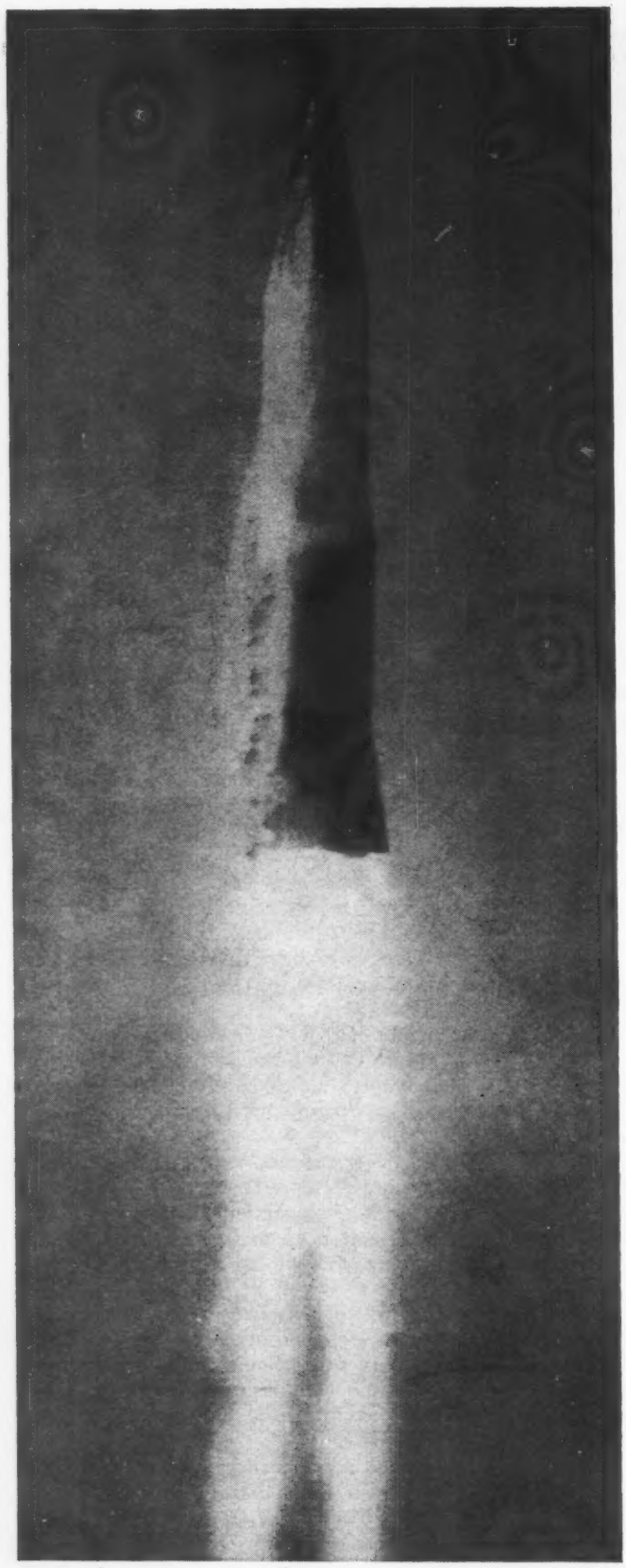
The J-3 has twice the speed and range of the J-2, and it is powered by a ramjet engine instead of a turbojet. This is one of the few Russian ramjet developments. Presumably this missile is gotten up to flight speed by using a booster rocket or some such similar device.

* * *

Now that Marshal Zhukov has been removed from his former high post, Soviet defense industry is being decentralized in the manner of other Soviet industry. The net effect will be to bring Soviet defense industry under more direct Communist Party control instead of military control, as in the recent past.

Similarly, in the armed services more emphasis is being put on Party control and training than was the case when Zhukov was head of the Ministry of Defense. When Stalin was in power, he insisted on Party domination of the military. But when Zhukov became head of the Ministry of Defense after Stalin's death, he deemphasized Party control and put matters back into the hands of the military commanders. But now the Party is coming back into its own again in the armed services.—END

AIRPOWER IN THE NEWS



A signal date in air history, December 17, anniversary of the Wright flight and the day of the first successful firing of the Convair Atlas, USAF's intercontinental missile. ICBM budget allotments have been criticized by AF chiefs.

SAC's 5,000-mile subsonic Snark is being built on this production line at Northrop's Hawthorne, Calif., plant.

■ What may be the trend of US defense organization, geared to maintenance and increase of deterrent strength in the face of Soviet advances, was foreshadowed by **President Eisenhower's** general program for reorganization of the Defense Department, as he outlined them in his "State of the Union" address. His speech, in the wake of the grim findings of the **Senate Preparedness Subcommittee,** left a promise of more details to come. He indicated he was studying the matter.

The points he stressed were: unified direction of strategic planning and control—efficiency without friction with a better integration of available resources with respect to new weapons—planning to prevent excessive compartmentalization creating confusion in the scientific and production program—**"decisive central direction"** to end interservice disputes—clear subordination of the military services to the civilian authority. For a text of a summary of the Rockefeller recommendations, see page 41.

■ The **Martin Titan,** which the Air Force considers its "backup" weapon to the already successfully fired Convair Atlas, may be ready for flight testing by April.

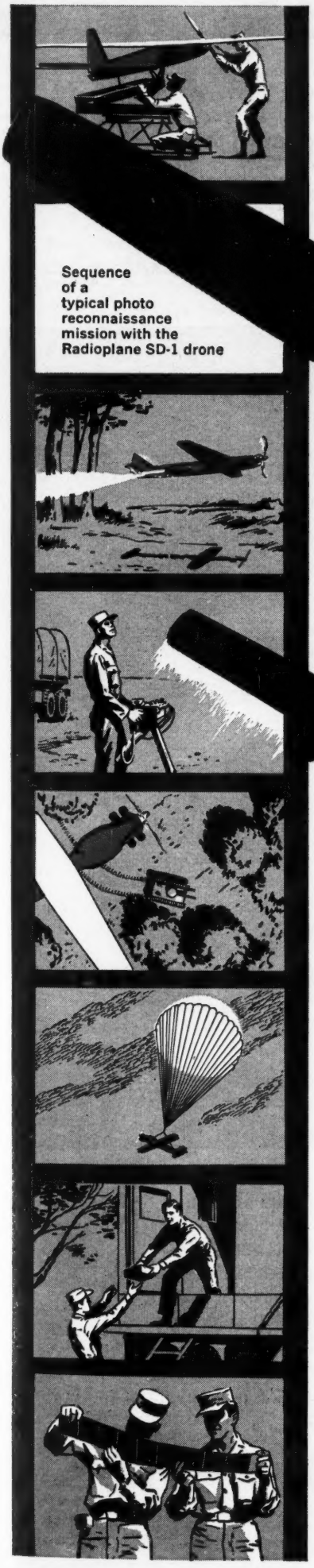
Titan's development pace has been the subject of heavy discussion and much criticism in the Senate Preparedness Subcommittee hearings. USAF Chief of Staff **Gen. Thomas D. White** and **Maj. Gen. Bernard A. Schriever** have both voiced complaint about fiscal limitations. General White told the subcommittee that he had made "every plea before every proper authority for several hundred million dollars additional," but that the money had been denied.

■ That man **is** and **will remain** the key to the control of space was underscored by USAF Chief of Staff General White in his recent **Wright Memorial lecture** at Denver as he addressed **USAF Academy** cadets.

Said the General: "The missiles that are getting the headlines today are but one step in the evolution from aircraft to piloted spacecraft."

The future, the General added, may see supersonic jet fighters or bombers in museums but "not because man has been eliminated as a direct participant. It will be because new equipment has been perfected to propel him higher, drive him faster, and so enable him to perform more tasks better."

(Continued on page 23)



Sequence of a typical photo reconnaissance mission with the Radioplane SD-1 drone

Eye in the Sky

SITUATION: *A range of hills screens enemy activities.*

TACTICAL PROBLEM: *What is on the other side of the hills?*

SOLUTION: *Aerial drone surveillance—puts an "eye" in the sky.*

Radioplane, in conjunction with the U.S. Army Signal Corps, developed and is producing the SD-1 surveillance drone system. Highly mobile, the camera-carrying SD-1 may be zero-length ground launched in rough terrain from a camouflaged position and flown by remote control over enemy installations on photo reconnaissance missions. After the drone's camera has exposed its film by radio command over the target, the SD-1 is then flown to a pre-designated area for parachute recovery. The camera is removed, the film is processed, and prints are delivered to the requesting unit within minutes after the entire operation began and the mission is accomplished without risking a pilot's life or a large man-carrying aircraft.

The Signal Corps SD-1 surveillance drone system is another example of Radioplane's constant refinement of the art of producing radio-controlled drones. First to manufacture target drones exclusively for military use Radioplane has a world-wide field support organization with personnel qualified to assist in all phases of drone field activities.

RADIOPLANE

A Division of Northrop Aircraft, Inc.

VAN NUYS, CALIFORNIA AND EL PASO, TEXAS

The General Motors Matched Power Team of Allison Prop-Jet Engines and Aeroproducts Turbo-Propellers Powers the New Lockheed Electra into the Air 56 Days Ahead of Schedule

ELECTRA UNDERWAY ON FLIGHT PROGRAM. Continuing ahead of schedule in all phases of production and flight, the new Lockheed Electra is already logging flight hours prior to the official start of CAA certification tests. Powered by four Allison 501 Prop-Jet Engines and Aeroproducts 606 Turbo-Propellers – CAA approved several months ago – this luxurious new passenger transport is America's jet-age answer to medium- and short-distance airline routes. Scheduled to enter commercial service late this year, the Prop-Jet Electra will bring jet-age comfort at cruising speeds of more than 400 miles per hour to air travelers everywhere–will bring new operating economy to the airlines of the world.

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ALLISON PROP-JET POWER

". . . The **capability to control space** will be the basic essential to **control of the surface of the earth,**" he stressed.

"No one can tell where air ends and space begins," the Chief of Staff pointed out, predicting that "at the rate things are going, I feel sure that **manned space flight will become routine** in a very few years."

■ The increasing national attention to space research was highlighted in recent weeks with establishment by the **National Advisory Committee for Aeronautics** of a special committee on space technology *(see page 50 for a full report on NACA).* Announcement of the new committee was made by **Lt. Gen. James H. Doolittle,** NACA chairman.

Heading the new group will be **Dr. H. Guyford Stever,** associate dean of engineering at MIT and former USAF chief scientist. The space technology committee will have a total of about fifteen members, each one a leader in some aspect of the broad field. Dr. Stever, in addition to his new post, has served with the Joint Chiefs of Staff's Guided Missiles Committee, the Guided Missiles Technical Evaluation Group of the Research and Development Board, and is currently vice chairman of the Scientific Advisory Board of the Air Force.

■ If you judged the information and recommendations of the **Rockefeller Report** *(see page 41),* calling for reorganization of the US defense structure, by the comments of the forces it could most damage, endorsements might increase even faster. Said **Tass,** the Soviet news agency, on the Report:

"It is aimed at kindling the flames of war hysteria and part of a campaign for increasing military expenditures which is organized by certain American capitalists."

They are the same peace-loving folks who said to the West, "**We will bury you,**" not too long ago.

■ A new era in transatlantic air freight opened in January with the first and second flights to Europe—without refueling—of the USAF's new giant **Douglas turboprop C-133** cargo transport. Flying the Great Circle route, both flights surpassed all previous times set by C-124s. The first flight, which was a round trip, was commanded by **Maj. William R. Stanton,** and carried a payload of 40,000 pounds each way, cruising at a 20,000-foot altitude. The second flight was commanded by **Col. Claude W. Smith. Brig. Gen. Francis C. Gideon,** commander of the 1607th Air Transport Wing, MATS, directed the operations and flew with the round-trip flight.

■ Space, and its ramifications, is crowding onto the pages of all sorts of publications these days. Even ***Vogue,*** the august arbiter of women's fashions, had a piece on the subject recently by **Anthony West,** containing this really sage observation:

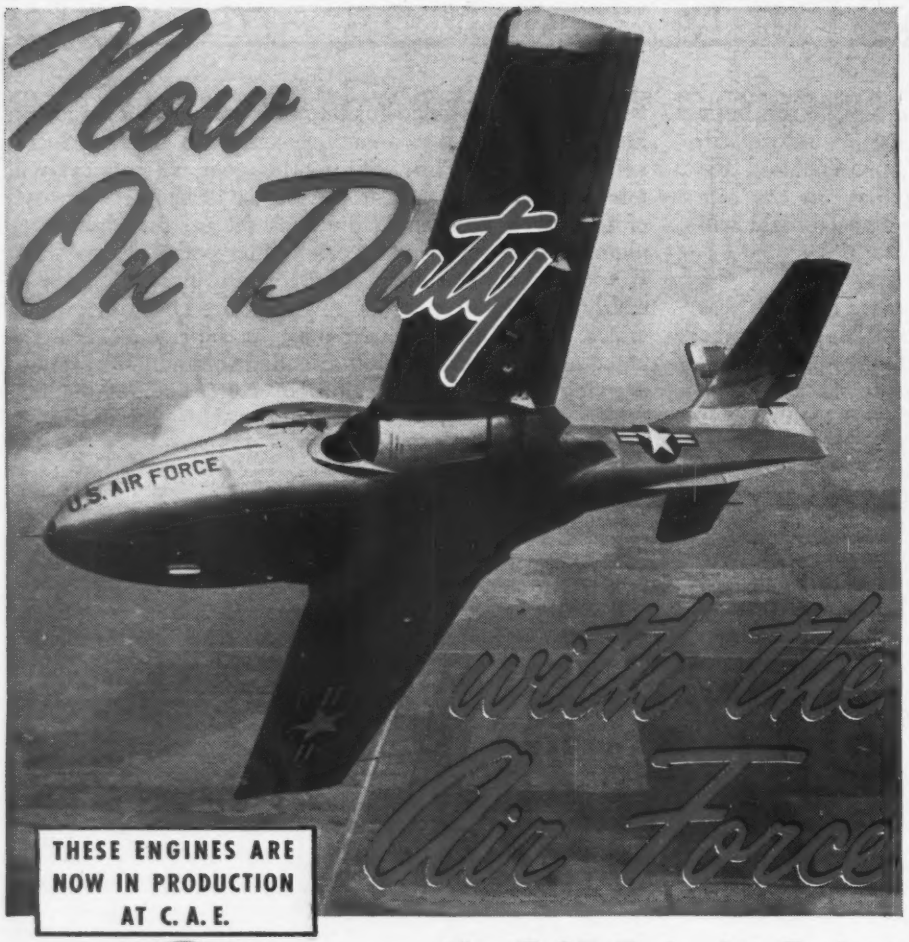
"There's no trick to space—it's nothing special. You live in it. When you get a sunburn, you're having a space adventure, you're being browned by something 93,000,000 miles away. . . . The earth you live on is on a space journey, circling around the galaxy with its sun at a speed of 200 miles per second. . . . The trip around the galaxy is going to take 200,000,000 years, we're on our thirtieth trip around, so far as we know. It doesn't matter, though, but you are traveling in space even when you're in your bath. You just **are** a space traveler, whether you like it or not."

■ "**Power for Peace**" will again be the theme of Armed Forces Day, scheduled for its **ninth annual observance** on May 17, according to announcement from Defense Secretary **Neil H. McElroy.** Again this year, all services will take part, with an area project officer designated for each of the seven geographic divisions set up for observance planning. Features of the celebration will include "Open Houses" where feasible in the US and overseas. Last year, nearly **7,000,000** persons saw parades and reviews in which more than 500,000 uniformed personnel participated and nearly 6,000,000 attended community programs marking the event. In addition, **more than 50,000,000** saw special television programs keyed to Armed Forces Day.

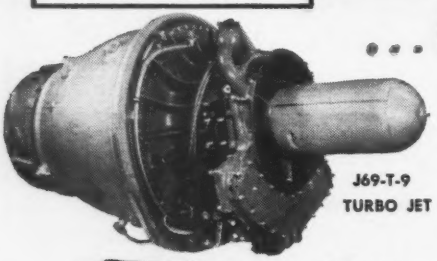
■ Even in a missile age, the USAF continues its attention to **personal arms training** for airmen. A cadre of about thirty top Air Force rifle and pistol marksmen have been selected to serve as instructors at the newly established **USAF Marksmanship Training Center** at Lackland AFB, Tex. Major mission of the marksmen will be to develop a corps of instructors to train airmen in arms at other bases. Objective of the program is to stress small arms proficiency as a fundamental military skill.

■ His fiftieth year in military service was recently marked by USAF **M/Sgt. Horst Tittel,** seventy-two, at San Antonio, Tex., Sergeant Tittel who served in two wars as an officer, is the **oldest man** with the **greatest number of years** in the Air Force. He was personally sworn in for his most recent hitch in 1954 by the then Secretary of the Air Force, Harold E. Talbott. He first enlisted in the military service with the Coast Artillery in 1908. In World War II, he rose to the rank of lieutenant colonel and served as adjutant of the 55th Bomb Wing, Fifteenth Air Force in Italy.

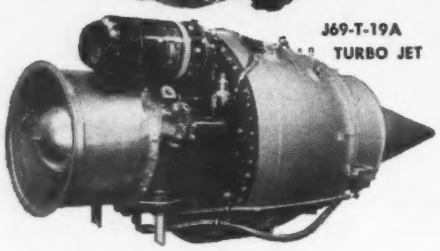
■ STAFF CHANGES . . . **Maj. Gen. David Wade,** who had been CofS, SAC is now assigned as Cmdr., 1st Missile Division, SAC, at Cooke AFB, Calif. . . . Succeeding General Wade as CofS, SAC, Offutt AFB, Neb., was **Brig. Gen. Edwin B. Broadhurst,** who assumed his new post December 15. He had been SAC's Inspector General. . . . **Brig. Gen. Paul S. Emrick,** who had been Cmdr., 6th Air Division, SAC, at MacDill AFB, Fla., succeeded General Broadhurst January 13 as SAC Inspector General. . . . **Brig. Gen. Harold H. Twitchell,** formerly Surgeon, CONAC, Mitchel AFB, N. Y., became Surgeon, USAFE, January 16. . . . **Brig. Gen. William H. Hipps,** who had been Cmdr., 313th Air Division, was assigned as Asst. to Deputy Inspector General for Inspection, 1002d Inspector General Gp., Hq. Command, Norton AFB, Calif., effective March 15. . . . **Brig. Gen. Milton F. Summerfelt,** formerly Deputy Chief, MAAG, Germany, will assume new duties as Deputy Cmdr., Sacramento Air Materiel Area, McClellan AFB, Calif., May 1. . . . **Maj. Gen. Herbert B. Thatcher,** who had been Deputy CinC, USAFE, has succeeded General Summerfelt as Chief, MAAG, Germany. . . . **Maj. Gen. Chester E. McCarty,** formerly Cmdr., Eighteenth AF, TAC, is now assigned as Cmdr., Twelfth AF, TAC, same station, Waco, Tex. . . . **Maj. Gen. Bruce K. Holloway,** formerly Deputy Cmdr., Eighteenth AF, joined General McCarty as Deputy Cmdr., Twelfth AF. . . . **Brig. Gen. James E. Roberts,** who had been Deputy Cmdr., Twelfth AF, USAFE, has been assigned as Asst. to CinC, USAFE. . . . **Brig. Gen. William K. Martin,** formerly Cmdr., 45th Air Division, SAC, Loring AFB, Me., is now Cmdr., 42d Bombardment Wing (Heavy), same duty station.—BILL LEAVITT



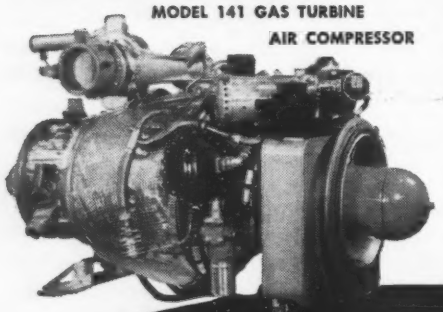
THESE ENGINES ARE NOW IN PRODUCTION AT C. A. E.



J69-T-9 TURBO JET



J69-T-19A TURBO JET



MODEL 141 GAS TURBINE AIR COMPRESSOR

... the T-37 Twin Jet Trainer with C. A. E. Turbine Power

Air Force flight training routine took a significant step forward recently, when the T-37 twin jet trainer entered its Phase VIII testing at Bainbridge Air Base, Georgia. Twenty hand-picked officers embarked on a course known as PROJECT PALM, with the two-way goal of training for them, and suitability testing for the plane. This new high-performance ship advances the jet phase of fliers' training to an earlier stage in the training schedule, speeding the transition from propeller-driven planes to jets, with gains in both safety and economy. Twin J69-T-9 turbines by C.A.E. provide the power.

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wing tips

By Wilfred Owen

The international airlines have agreed on a new "economy service" on transatlantic hops beginning in April, at fares twenty percent below present tourist-class rates. The new fare from New York to London will be $252 one way and $453.60 round trip. Seating will be tighter than tourist, food will be simple, no alcoholic drinks will be sold—but your baggage allowance will be the same as on tourist flights, forty-four pounds.

° ° °

Present first-class and tourist air fares across the Atlantic are going up when the new economy rates become effective. The one-way fare from New York to London first class will jump from $400 to $435, while tourist class will be up from $290 to $315.

° ° °

CAA airport traffic control towers handled close to 24,000,000 takeoffs and landings during the fiscal year 1957, a sixteen percent increase over the year before. More than one million instrument approaches were handled, forty-seven percent more than the previous year. Part of the reason for the jump was the agreement among all airlines in the Washington-New York-Chicago triangle to conduct their operations exclusively under instrument flight rules.

° ° °

Every eighteen minutes a scheduled airliner completes a crossing of the North Atlantic or Pacific Ocean.

° ° °

Sightseeing in the nation's capital can now be done by helicopter. Washington's sightseeing buses have announced a tie-up with Pilgrim Helicopter Services for three-dimension touring.

° ° °

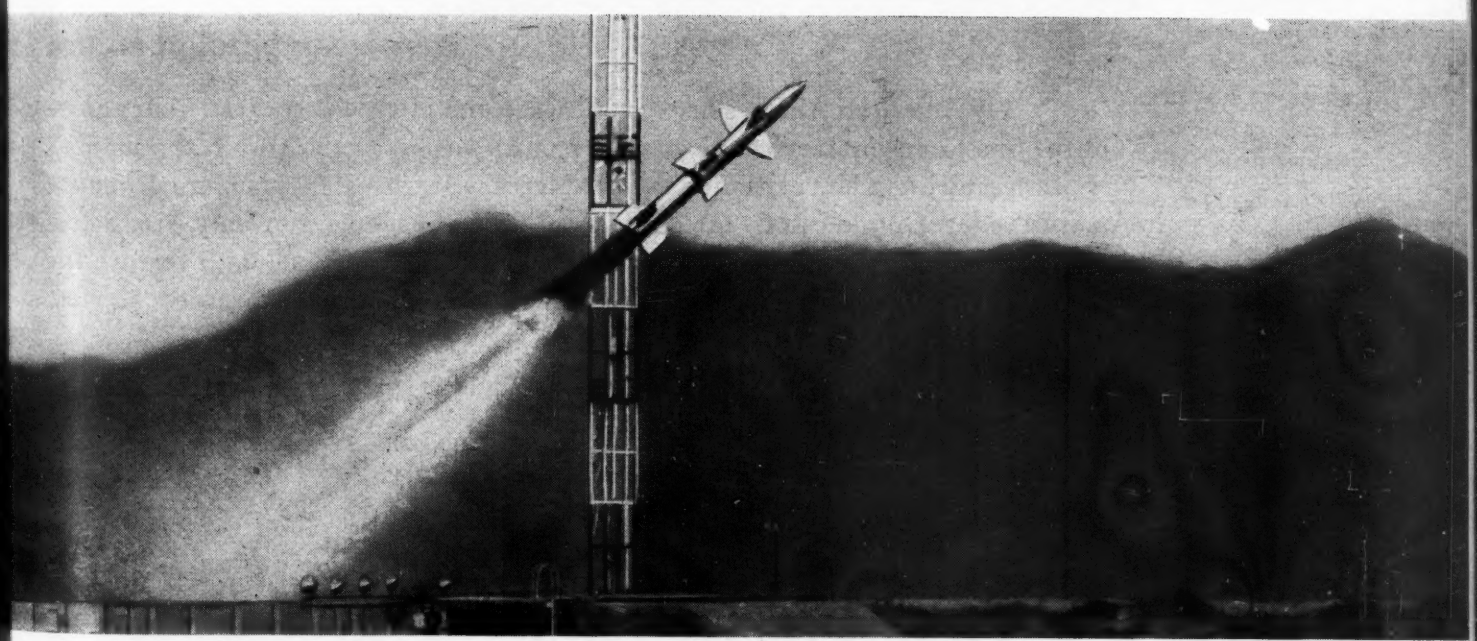
In Washington, D. C., where car pools flourish in extraordinary numbers, three gentlemen have now formed a plane pool. A chartered plane picks them up at National Airport on Friday, makes the twenty-minute run to the Easton, Md., airport, and flies them back to work on Monday after a weekend down on the farm.

° ° °

American Airlines has completed the first college built for the sole purpose of training airline stewardesses. The $1 million, twenty-two-acre campus between Dallas and Fort Worth is equipped to turn out 1,000 stewardess graduates per year.

a step beyond push-button warfare!

TALOS



This Talos launching from the RCA Defense System on Dec. 13, 1957, resulted in direct hit on distant drone plane.

The RCA Talos Defense System is the first *completely automatic* land-based system for launching and guiding missiles, and utilizes the Talos Missile developed by the Applied Physics Laboratory and produced by Bendix. The Defense Unit receives target signals from remote outposts, analyzes them with regard to number of attackers, location, course and speed. Next, computers determine the logical points of interception, order the missiles loaded on launchers, guide them at supersonic speed to the vicinity of the target, after which the missiles "lock" on the target and close in for its destruction. All without even the touch of a button! The RCA Talos Defense System, with its electronic equipment and guidance systems, was designed, developed and built by RCA as prime contractor, aided by many subcontractors. It was turned over to the U. S. Army on October 15, 1957, and is a missile milestone, exemplifying the continuing determination of American enterprise to secure peace with honor and justice.

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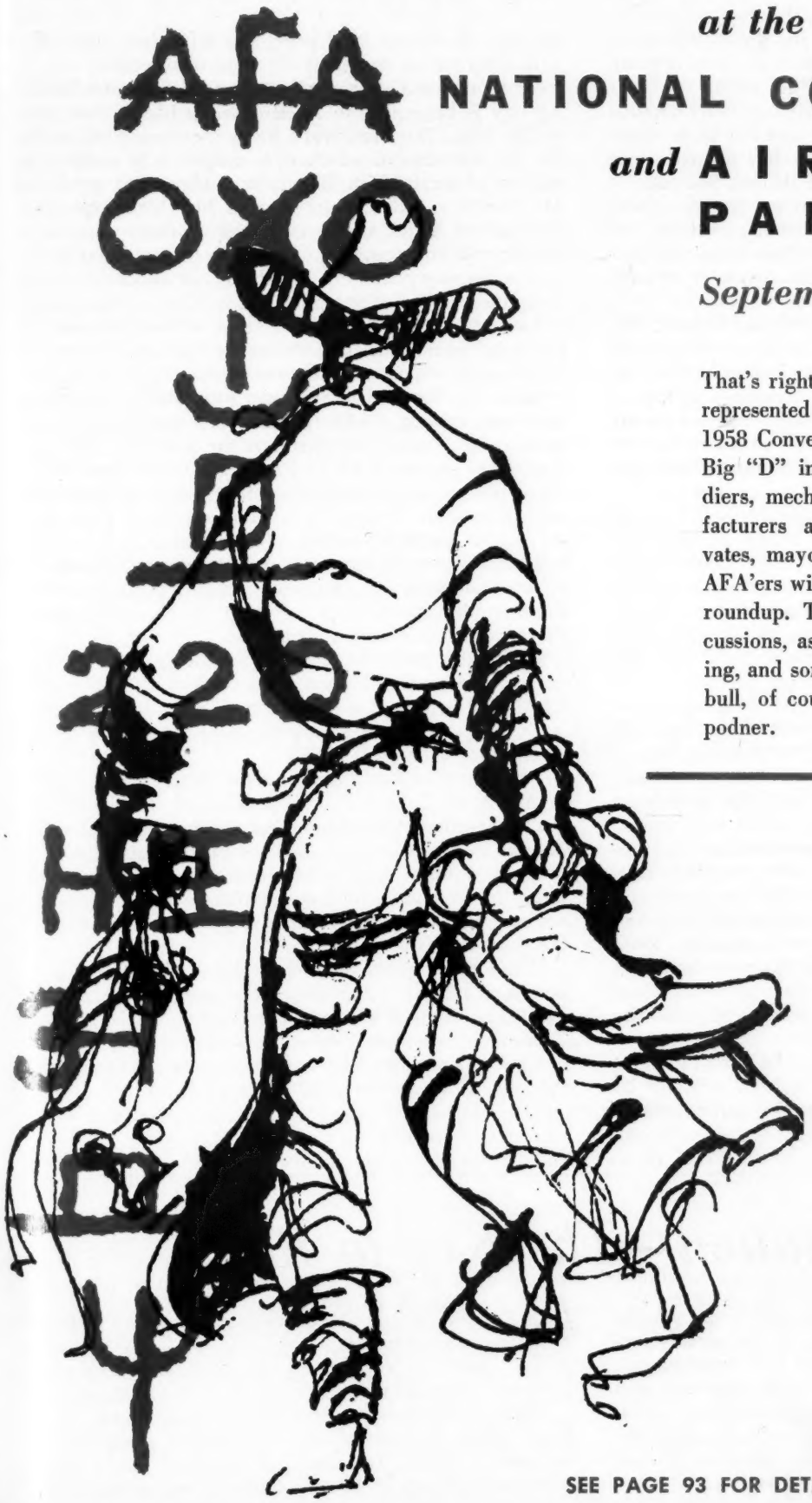

That's right! Every brand of aviation will be represented at the Air Force Association's 1958 Convention and Airpower Panorama in Big "D" in September—pilots and bombardiers, mechanics and mess sergeants, manufacturers and suppliers, generals and privates, mayors and governors, and just plain AFA'ers will be on hand for the big airpower roundup. There will be serious defense discussions, as well as some serious elbow-bending, and some ridin', ropin', and shootin' (the bull, of course). Better plan to be on hand, podner.

PROGRAM HIGHLIGHTS

- **THURSDAY • SEPTEMBER 25**
  AFA Business Sessions
  Reserve Forces Seminar
  Panorama Preview Reception
- **FRIDAY • SEPTEMBER 26**
  Space-Age Symposium
  Airpower Panorama
  Airpower Luncheon
  Western Wing Ding
- **SATURDAY • SEPTEMBER 27**
  AFA Business Sessions
  Industry Briefings
  Airpower Panorama
  Awards Banquet
- **SUNDAY • SEPTEMBER 28**
  Farewell Brunch

NOTE: There will be an AFA Leaders Workshop Wednesday afternoon, and an AFA Directors meeting Wednesday night.

SEE PAGE 93 FOR DETAILS ON HOTEL RESERVATIONS

VIEWS & COMMENT

Air Force Budget a Poor Gamble

THE Eisenhower defense budget for fiscal 1959 offers a poor gamble in airpower, but there is a strong possibility that Congress will change the odds.

We can find no evidence that the political determination to balance the budget at almost any cost has been weakened by anything the Administration has learned since early October, when Russia launched its first Sputnik.

Major procurement and production for the Air Force faces an expenditure cut of $163 million. Outlay for manned aircraft will go down $440 million under the program, while spending for guided missiles increases by $142 million.

Defense Secretary Neil H. McElroy emphasizes that USAF will get about $910 million in additional obligational authority even before the beginning of fiscal 1959. He seems convinced that more ballistic missiles—a couple of dozen IRBMs in the next eighteen months—will ensure our deterrent power if combined with work on a now remote ballistic missile detection system and improved dispersal for the Strategic Air Command.

Gen. Thomas D. White, USAF Chief of Staff, warned that SAC is headed downhill even before McElroy expounded his defense of the proposed budget. The general said his big bombers will be in a "doubtful situation a year from now for about a year." He made no comment on the fact that production of the B-52 intercontinental bomber will wind up in July, just as the new fiscal year starts. This may be the riskiest part of the big budget gamble.

On the eve of congressional budget hearings, other USAF spokesmen were expected to make it clear on Capitol Hill that they are not satisfied with the program, mainly on the basis that there is insufficient attention to modernization of the manned wings that must carry the air defense burden in the immediate future.

On top of this, expenditures for maintenance and operation in fiscal 1959 are stopped at a little over $4 billion, up only $90 million over the present fiscal year and still the same twenty-two percent of the total USAF outlay.

It should be impressed upon Congress that the M&O squeeze of fiscal 1958 is not a thing that can be swept under the rug, despite a reduction in the number of wings from 130 to 105 and a cut in the inventory of planes by more than 1,200. An informed estimate says M&O money in the proposed USAF budget falls short of need by nearly $300 million. There is a backlog of general work to be done at USAF bases, much of it involving aircraft maintenance. Necessary local purchases have been put off to help keep within the fiscal 1958 spending ceiling.

The Defense Department's Advanced Research Projects Agency is beginning to smell strongly like a new camel in the tent. The President's budget carries $340 million for this activity, of which it is proposed to spend $200 million in fiscal 1959. When the budget was presented, Mr. McElroy still had not located his "highly qualified" director for ARPA, and it is not clear where the director in turn will find competent people to put on his staff.

The Secretary says the agency is not expected to take over research and development of weapon systems, which fall clearly within the mission of a military department, but it has been clear from the outset that astronautics will be the most important field of activity.

Maj. Gen. Bernard A. Schriever suggests that ARPA will duplicate existing USAF facilities. Not mentioned by the general but equally significant is the fact that $165 million of the proposed ARPA fund was moved there from a USAF slot, where it would have been spent on anti-missile missile projects. Some $75 million was taken away from the Army, and $100 million is "new money."

Another germane observation is that the National Advisory Committee for Aeronautics, a going organization of some repute, knows at least as much about astronautics as Procter & Gamble knows about soap.

Under the proposed budget, NACA arithmetic shows an increase of $6.5 million, to a total of $100.5 million. USAF will be forced to keep its R&D spending at a steady level, $730 million or four percent of its budget. This is no increase over fiscal 1958.

It is fortunate that there are some skeptical eyes looking at ARPA on Capitol Hill. Sen. Richard B. Russell (D., Ga.), chairman of the Senate Armed Services Committee, may be one of the critics. All we need to straighten out the missile program, says the Senator, is a "two-fisted Secretary of Defense." With that panacea, he says, there is no need for a new agency or a reduction in the power of the Joint Chiefs of Staff.

If the new budget has a high point of merit, it is the provision of pay adjustments for civilian workers and parallel acceptance by the Administration of the Cordiner Committee recommendations for an improved military manpower program. The latter has gone to Congress in the form of a separate $500 million pay bill.

—CLAUDE WITZE

Organization—The Key to R&D

Why *we fell behind and* how *we can catch up with the Russians and stay ahead of them are two inseparable factors in our quest for improved research and development. To Dan A. Kimball, former Secretary of the Navy and now president of the Aerojet-General Corporation,* proper organization *is the key to the dilemma. He recently expressed himself strongly on the matter to the American Rocket Society, and we reprint his comments in part:*

WE could have built a satellite ten years ago if we had concentrated on it.

And now is the time to concentrate and set a plan in motion for what we're going to do in the next ten years.

Starting and stopping is what has jeopardized our defense efforts and our missile and satellite programs over the past ten years. You don't get anywhere unless you set a course and stick to it. Any start-and-stop program ends

up with a stop—which means you're going nowhere.

I'm going to propose to you tonight—and through you to the American people and their leaders—a program which I sincerely believe will put America on the road to missile supremacy. Basically, it involves setting up *an effective organization for missile supremacy* to replace the haphazard system we've been using.

First of all—why are we in this seeming confusion so dramatically highlighted by the success of the Russian satellites?

How did we get in this position?

What have we got to do to recover world leadership?

To my mind there is one basic answer to all these questions, and that is *organization.*

We don't need any more overlapping agencies. What we need is a simplified organization which will let the armed services develop their own programs under proper supervision.

The time to make these changes is now, while the issue is hot and there seems to be an urgency to do something.

Let us *not just do something*—let us be sure we do the *right thing.*

The appointment of Dr. Killian, Special Assistant to President Eisenhower for Science and Technology, is a good starting point, but we must go a lot deeper and further. We need more than advice to the President. We need decisions—decisions that stick—in the Defense Department. We need to have these decisions implemented by the military services—not by a hodgepodge of Department of Defense people trying to adjust the military programs.

Research and development project management requires a rather large and competent technical and procurement staff. Such a staff does not exist in the Department of Defense and obtaining such a staff would be difficult and time consuming. A research and development organization has no place in the Department of Defense, where it duplicates the separate efforts of the armed services.

The satellite and space weapons programs which are just ahead will require hardware, facilities, and trained people. The nucleus of these now exists in such a program as the Air Force ballistic missile program, where the effort has been to develop hardware, production facilities, and to train personnel for operational duties in parallel.

Double management—by the services and by the Department of Defense—results in confusion and inefficiency. There is always present potential or actual interference—always at higher cost to the government and loss of quality in the end product.

Then we need advanced research. This means research beyond the satellite and antiballistic missiles programs of today. These programs are clearly military, and the problem of making them operational belongs to the services, not to an advanced research agency. The job of making present programs operational takes time. This must be done concurrently with research and development, not afterward. At the same time production techniques, logistic support, training, and base requirements must be set up apart from the R&D effort.

Any research agency which would try to supervise all these phases of missile development would only introduce excessive costs, unnecessary delays, and inferior end products from the operational point of view.

What we need is not so much another high-level organization as a new kind of organization at high level—an organization which will simplify, not duplicate, the task of reaching an effective solution to our missile problems.

We need a system which will supervise but not interfere.

Some Hard Facts for a Harder Future

On January 9, Maj. Gen. Bernard A. Schriever, Commander, USAF Ballistic Missile Division, gave the Senate Preparedness Subcommittee some hard facts on the steps necessary to ensure US supremacy in missiles and astronautics. His statement, released through the Defense Department, follows:

MY purpose here today is to assist your Subcommittee in defining and evaluating the kind of future performance and programs which are required if we are to give our country undisputed leadership in the fields of ballistic missiles and astronautics.

As I see it, we face two challenges: one immediate, the other long range. Meeting each one successfully is vital to the maintenance and strengthening of our national security.

In seeking to provide you with what in my opinion are concrete answers to these questions, I am not going back over past history. The concern we all share now is with history in the making—and what we can do to make that history lead us toward the security we require.

In looking now to the future, the immediate question is, what can be done to further compress the time within which we will achieve significant operational forces of intermediate-range and intercontinental ballistic missiles? How can we close the gap that now exists between our country and the Soviet Union with respect to the availability of these weapon systems?

The Thor IRBM will be the earliest operational ballistic missile. Our planning now stipulates fifteen missiles per squadron.

The present Department of Defense directive, which calls for both Jupiter and Thor squadrons, does not achieve at the earliest date the deterrent power which is well within our capabilities. If a decision is made immediately to increase our rate of production over the currently approved maximum rate, by early 1960 we can deploy twice as many operational IRBM squadrons, all Thor-equipped. The first two Thor squadrons would be overseas by the end of calendar year 1958.

The next addition to our ballistic missile force will be the Atlas ICBM, on which research and development has been, and is, proceeding about as rapidly as possible. We expect to equip our first Atlas operational complex in the near future. The force buildup beyond that first unit, however, can be appreciably accelerated beyond current plans. This can be accomplished by an immediate decision to double the currently approved maximum rate of production of Atlas missiles. This will permit us to equip almost double the total Atlas squadrons called for in the next few years. This also is well within our capabilities.

The third, and most advanced ballistic missile in our force of the immediate future will be the Titan ICBM. Here again our research and development is progressing at a rapid rate. Our most recent assessment, however, shows

(Continued on following page)

that we have the capability to equip twice the number of Titan squadrons indicated by currently approved schedules.

Our estimates show that the additional strength provided by these accelerations of our missile systems can be accomplished by means of relatively small increases in the expenditure of funds allocated for the remainder of FY '58. However appropriation of considerable additional funds over those presently budgeted for FY '59 would be required.

It would be a colossal blunder if we were not to plan beyond the point of matching every Soviet ballistic missile with one of our own. We must continue to refine and improve this first generation of ballistic missiles, in effect progressing to a next generation of missiles. We can provide in the slightly more distant future greater accuracy, greater destructive potential, greater range, greater simplicity, greater mobility, but at less cost. All of this we can do and are now planning, and all of this demonstrates once again that there is no fixed, final and frozen solution to the problem of national defense, any more than there is any ultimate weapon.

The second challenge, as I analyze the future, is in the longer-range field of astronautics. Here the military requirements are at present less clearly defined, but are no less demanding of an immediate, vigorous program designed to surpass Soviet capabilities in this field.

Fortunately we are already a long way down the road. The original investment for preliminary projects in space flight has already been made in our present Air Force ballistic missile programs.

We have already provided for approrimately $500 million worth of new facilities designed for development, testing, and production of ballistic missiles—facilities nonexistent only three years ago. We have a vast military, scientific, and industrial organization experienced in the design, development, testing, and production of ballistic missiles. Moreover, this organization is staffed by personnel of the greatest competence who have mastered many new fields of knowledge which can be springboards to substantial shortcuts in our mastery of astronautics.

In my opinion, these presently existing assets provide our best steppingstones for every advance we can expect to make into this new age of space science and technology. Our studies have shown that by using our presently existing rocket engines and missiles, we can provide both at the earliest date and at the greatest economy not only unmanned reconnaissance of the moon, but also a basic vehicle for manned space flight. I believe that any program to develop a separate astronautics agency would result in duplication of capabilities already existing in the Air Force ballistic missile programs, and at a cost in funds and time similar to that already expended on these programs.

If we are to take full advantage of our present astronautics potential, these are some of the projects we can immediately initiate:

1. Our present Thor missile with existing second-stage hardware can place a satellite in orbit with a respectable payload.

2. By adding existing third-stage hardware, this vehicle can perform unmanned reconnaissance of the moon at a relatively early date.

3. A slightly modified Thor plus a high-energy fuel stage which we have been developing can make possible initial unmanned reconnaissance of Mars and Venus.

4. The Titan booster when developed plus high-energy second and third stages could put much greater weights into orbit and could provide extended manned satellite missions. This vehicle could provide manned flight around the moon and back to the earth.

Many far-reaching potential capabilities are apparent as we look more into the future and develop the possibilities of thermonuclear propulsion and payloads up to hundreds of tons. These few specific examples of capabilities now at hand and their times of realization, however, strongly emphasize the requirement for initiating these projects immediately if we are to have any chance of leading in space technology in the 1965-1970 time period.

The entire astronautics development program which I have touched upon can be initiated at once with no dilution or diversion of our ballistic missile programs.

As I analyze the future, if we are to meet the challenging requirements of either ballistic missile acceleration or of astronautics, we must recognize where our strongest capabilities lie today, and make certain decisions now. The decisions we make today will exert momentous influence on where we stand tomorrow, and must point to well planned, clearly defined objectives.

Today's situation calls for bold decision and calculated risk and funds.

Crisis Deepens—But How Much?

IN THE wake of one of the longest and most painful periods of soul-searching in our history, there seems to be developing, at least partially, a new mood of official recognition of the critical US position in the military and technological race with the Soviets.

The President, in his State of the Union address, acknowledged, but still qualifiedly, that "if we make the necessary effort, we will have the missiles, in the needed quantity and in time, to sustain and strengthen the deterrent power of our increasingly efficient bombers."

In its tone, the President's speech was calm—many observers found it *too* calm—but his view of the national situation seemed more clear than in previous statements. Facets of this increased recognition were his references to the need for unified defense planning and his promise to explore further what could only be the recommendations of the Rockefeller Report. Also, his request for a fiscal 1958 supplementary appropriation of nearly $1.3 billion and his projected increase in defense expenditures for fiscal 1959 seemed hopeful, although modest in relation to obvious needs.

But his continued stress on balancing the budget, even in the face of Soviet threats on all fronts, was indicated in his statement that "in spite of these necessary increases, we should strive to finance the 1959 security effort out of expected revenues."

Meanwhile Congress, in a definite mood for action, moved ahead with its study of the defense posture. The Senate Preparedness Subcommittee continued to hear disturbing appraisals of US deterrent strength that underscored the warnings, reported here last month, of expert

(Continued on page 33)

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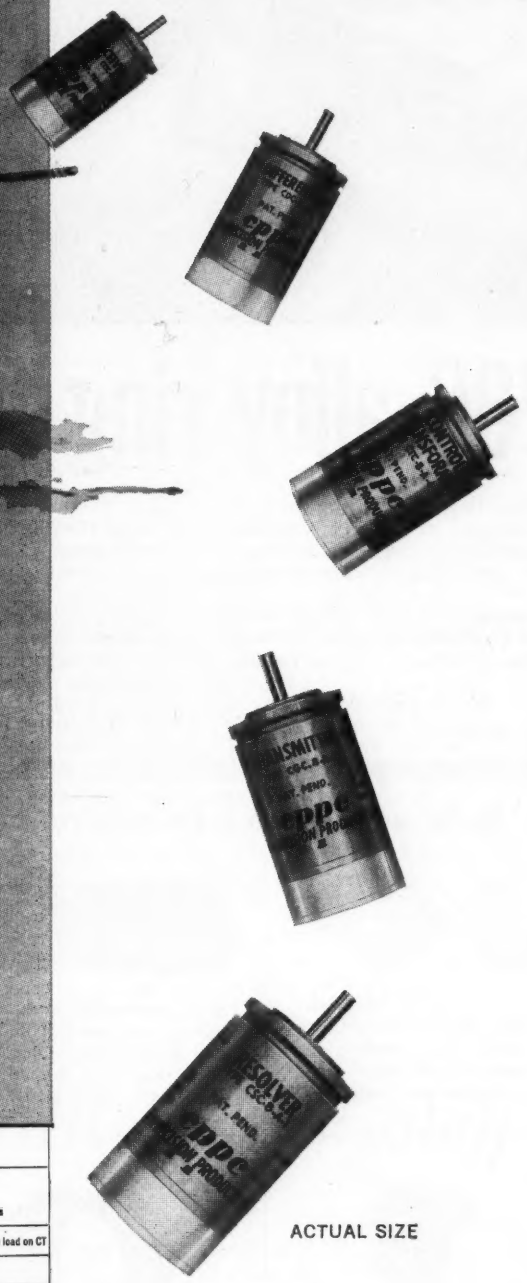
	Input Voltage (Volts)	Input Current (Amps.)	Input Power (Watts)	Output Voltage (Volts)	Sensitivity (MV/deg.)	IMPEDANCE		Phase Shift (deg.)	Remarks
						Input	Output		
Transmitter→Control Transformer	26	.111	.74	22.5	393	58+j226	626+j233	19	High Impedance load on CT
Transmitter→Control Transformer	26	.111	.75	21.6	377	58+j226		19	50° load on CT
Transmitter→Control Transformer	26	.110	.83	19.2	335	64+j221		17	5° load on CT
Transmitter→Differential→CT	26	.134	1.78	19.5	340		748+j364	40	Output to High Impedance
Electrical Resolver→Electrical Resolver	11.8	.115		7	120			52	Input to stator
Electrical Resolver→Electrical Resolver	26			15	260			53	Input to rotor

and . . .

made provision to deliver much larger quantities with their new Colorado Springs synchro facility



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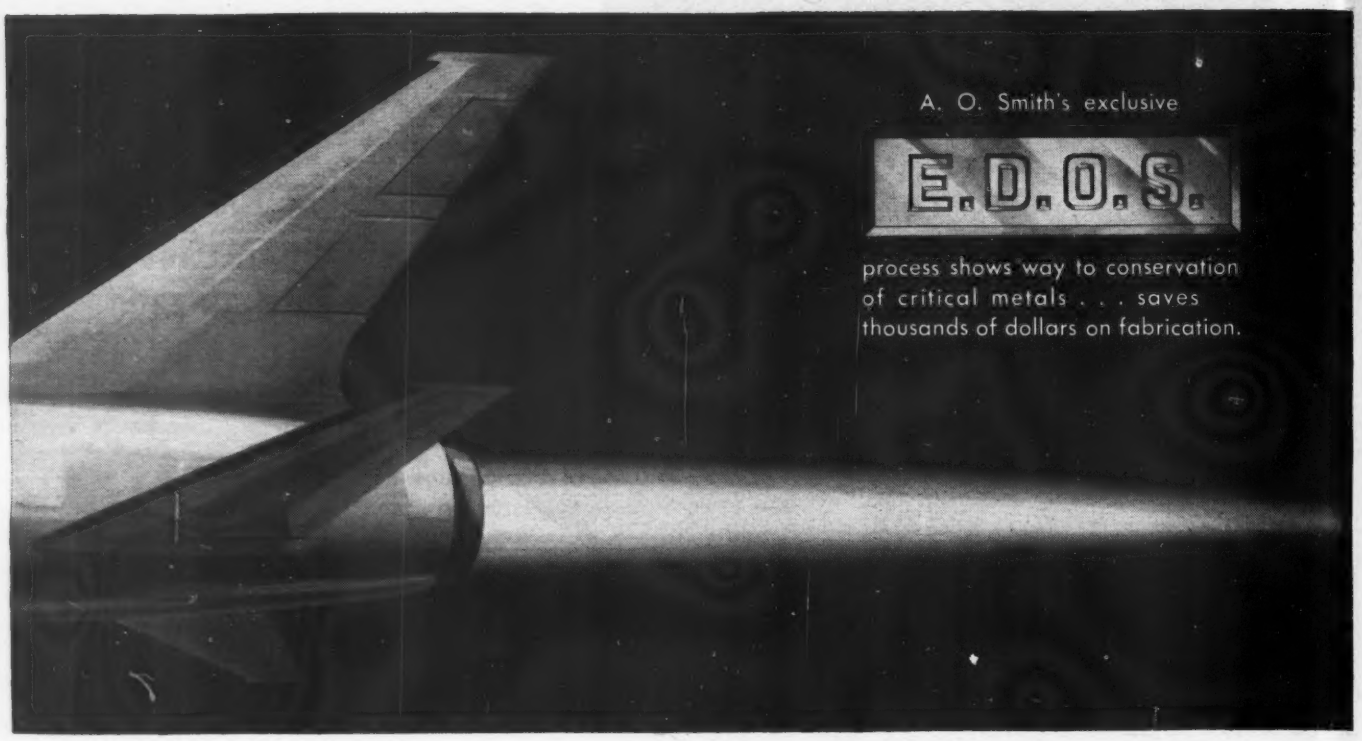
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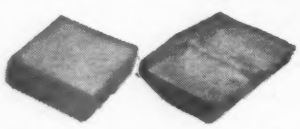
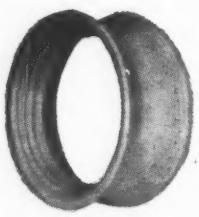


At left is one of the four high-nickel alloy blanks. At right, the same blank after pre-forging. Basic materials cost about 50% less than conventional processes.

After pre-forging, each piece is rolled and re-rolled to attain the final configuration. Piece shown has gone through initial rolling.

Then, the pre-forged and rolled blanks are formed into quadrants.



. . . and the 4 quadrants are flash-welded to form the finished part. Relatively small machining job still needed is done by the customer.

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witnesses like Dr. Edward Teller and Lt. Gen. James H. Doolittle. And much of the testimony indicated an urgency that was still not apparent in the President's speech. Among the most disconcerting testimony was that of USAF Chief of Staff Thomas D. White, his Vice Chief of Staff, Gen. Curtis E. LeMay, and Rear Adm. Hyman G. Rickover, who went as far as to say it might be too late for us to catch up with the Russians.

Some of the testimony of the USAF witnesses follows, as an indication of the continuing deep concern of the military.

This exchange occurred as Sen. Lyndon Johnson (D., Tex.), chairman of the Preparedness Subcommittee, questioned General White:

Senator Johnson: Do you think we have taken the steps that will ensure us catching up?

General White: With the single exception of a more rapid push on the Titan, which is another series of intercontinental ballistic missiles.

Senator Johnson: When have we taken those steps? Have they been accelerated since October 4?

General White: They have not, no sir.

Senator Johnson: There have been no steps, to your knowledge, since October 4?

General White: Not on the Titan program.

Senator Johnson: On the entire missile program?

General White: On the Atlas program, yes sir.

Senator Johnson: General White, it has been said that the Jupiter C missile has been fired as far as any Soviet missile. Does this mean we are up to the Soviets in missile development, in your opinion?

General White: No, I don't think that is an indication. It takes more than distance. You have to have guidance and a number of other things.

Senator Johnson: General, is SAC our only shield against attack at the present time?

General White: Well, it is difficult to say it is the only one; all the services have a part, but SAC is unquestionably—

Senator Johnson: Do you think there is anything else that is really deterring them?

General White: Well, I think the air defense of this nation is an element of deterrence. I think the NATO shield is an element of deterrence; I think that our forces in the Far East are an element of deterrence; but the overriding power that this nation has at the moment is the Strategic Air Command.

General White went on to point out the vital need for measures to ensure personnel retention, endorsing the aims of the Cordiner proposals, calling for redeployment of tankers, additional tanker bases, attention to B-58 and chemical and nuclear-powered bomber development, and the modernization of TAC for "limited war" situations.

Senator Johnson asked the Chief of Staff if he was satisfied with action that had been taken on some of his recommendations.

At Air Force level, he was satisfied, but not entirely at Defense Department level, General White replied.

General White's testimony was given in December. Weeks had passed when on the very eve of the President's State of the Union Message, the General again appeared to tell the Senators that ICBM production would *not* be speeded up "as much as they can and should be" under the Administration's projected new defense budget. General White, according to Senator Johnson, said he had made every plea before every proper authority for several hundred million dollars additional in the new budget, but that the requests had been denied.

Another Air Force witness, Gen. Curtis E. LeMay, never one to pull punches, gave the senators a candid view of his appraisal of the country's present deterrent strength. Some of his testimony follows. The subcommittee's counsel, Edwin L. Weisl, was doing the questioning.

Mr. Weisl: In 1956, General LeMay, you testified that a strong attack would probably destroy most of our bases in the United States. Does this testimony still stand today?

General LeMay: Yes, I think so.

Mr. Weisl: What can we do to protect ourselves against that sort of a tragic eventuality?

General LeMay: Your best defense is to prevent the attack from ever starting.

Mr. Weisl: How can we do that?

General LeMay: By providing a deterrent force that will guarantee a war never starting.

Mr. Weisl: But you do not have that deterrent force today, do you, General LeMay?

General LeMay: I think we have it today. Certainly we are not at war today; that is the strong point in favor of a deterrent force being effective, and if we did go to war today, I think we would probably win it. However, I say that with less confidence than I said it in April 1956.

What Generals White, LeMay, and so many other witnesses said (at this writing, the hearings continue) served a vital purpose—getting across to the country the need for stepped-up action on a wide scale to strengthen US de-

(Continued on following page)

Claude Witze Joins AIR FORCE Staff

CLAUDE Witze has joined the staff of AIR FORCE Magazine with the title of Senior Editor.

Witze comes to AIR FORCE from *Aviation Week*, a McGraw-Hill publication, where he had been Military Editor since early 1954. In addition to covering the Pentagon, he has visited extensively at military installations in Europe, the Middle and Far East, and the continental United States.

Before joining *Aviation Week*, he was Director of Public Relations for Vertol Aircraft Corp., Morton, Pa. While in that post he served as a member of the Public Relations Advisory Committee of the Aircraft Industries Association.

In addition to the above experience, Witze was a newspaperman for seventeen years, much of that time as Aviation Editor of the Providence, R. I., *Journal-Bulletin*.

He was graduated from the Columbia University Graduate School of Journalism in 1933. Born in Gloversville, N. Y., forty-seven years ago, he is married, has three children, and lives in Bethesda, Md. One son is a sophomore at the Massachusetts Institute of Technology. Another son and daughter are in high school.

Witze is national secretary of the American Helicopter Society. He is also a member of the Aviation Writers' Association, the Washington Aero Club, the National Aviation Club of Washington, the National Press Club, and the Institute of the Aeronautical Sciences.—END

fense and with it, our entire national economic structure.

It is notable that so many of the dynamic suggestions are issuing from groups of private citizens, like the men who gathered the information for both the Rockefeller Report and the still suppressed Gaither Report, while euphemism still characterizes so many official statements on our defense posture. Harsher words might far more effectively serve the purpose of awakening public support for increased programs. There is still a discernible reticence to speak bluntly. That kind of holding back has often in the past led to the kind of on-again, off-again economy policies that have added costly delays to defense developments.

In that connection, the comments of Maj. Gen. Bernard A. Schriever, Commander, USAF Ballistic Missile Division, during his testimony at the hearings, are significant.

Said General Schriever: "We started this [ballistic missile] program in 1954 and we really built up a tremendous momentum, and management and industry were called into the Pentagon. We had meetings with them and we dealt with the top management of each of these companies. They were highly motivated to get this job done just as quickly as they possibly could.

"Now, during this past year, there has been this economy wave, and I am fully conversant with how these things operate in this country, and we had to make certain adjustments in the program, and we applied all kinds of controls of one kind or another. These are inhibitions. They are psychological. But, neverthless, you lose a certain amount of momentum."

The General's comment on the psychological aspects of on-again, off-again really touches the core of the matter. Perhaps it is there the Soviets really surpass us. Their psychology is prescribed. Presumably, their scientists are encouraged not only by high incomes and prestige but by continuous pronouncements that the Soviet cause must inexorably triumph, whether tomorrow or in a hundred years.

Implicit in the conclusions of both the Rockefeller and Gaither Reports is the belief that the US must gear, not only for the big war that could come, but also for the prospect of interminable cold war and competition with the Russians on all fronts.

Not long ago, George R. Price, in *Life* magazine, wrote an article "Arguing the Case for Being Panicky!" Projecting US weakness, he suggested that the final outcome might be, in several steps ranging from Soviet all-out military supremacy to blackmail of and breakup of NATO, the actual surrender and absorption of the US by USSR.

Such a hypothesis could be potential history. In our own time, we have seen the power of France fall away, to avoid bloodshed, before the juggernaut of superior (but as history proved later) not insurmountable force.

—WILLIAM LEAVITT

Today's Dilemma Was Yesterday's, Too

Veteran Washington observer Arthur Krock, of the New York Times, *in commenting on today's mounting pressure to reorganize the Department of Defense, went back a few years to the famous Lovett memorandum of 1952. The memorandum was sent by Secretary of Defense Robert A. Lovett to President Truman and, in Krock's words, "Among the many documents that bear on the [defense reorganization] problem none is the product of as much direct experience. . . ."*

Mr. Krock then summarized the memorandum as follows:

IN THE event of war an essential job [of the Pentagon] will involve "distributing shortages" among Army, Navy, and Air Force (manpower, materiel, transportation, communications, funds, etc.). . . . I believe the present system of controls [would] prove to be inadequate.

The Act requires the Secretary of Defense to make use of interservice committees for much of his "staff work," and prohibits him from having a military staff. In time of war [he] would, therefore, find himself unable to handle the distribution of shortages in an efficient and direct fashion.

The Act has the fault of all compromises: . . . contradictions and straddles. . . . [For example], the question has been raised whether the Joint Chiefs of Staff are directly under the Secretary. "In my opinion, the Secretary's authority is superior to theirs," but the President "should clarify the matter by a simple directive."

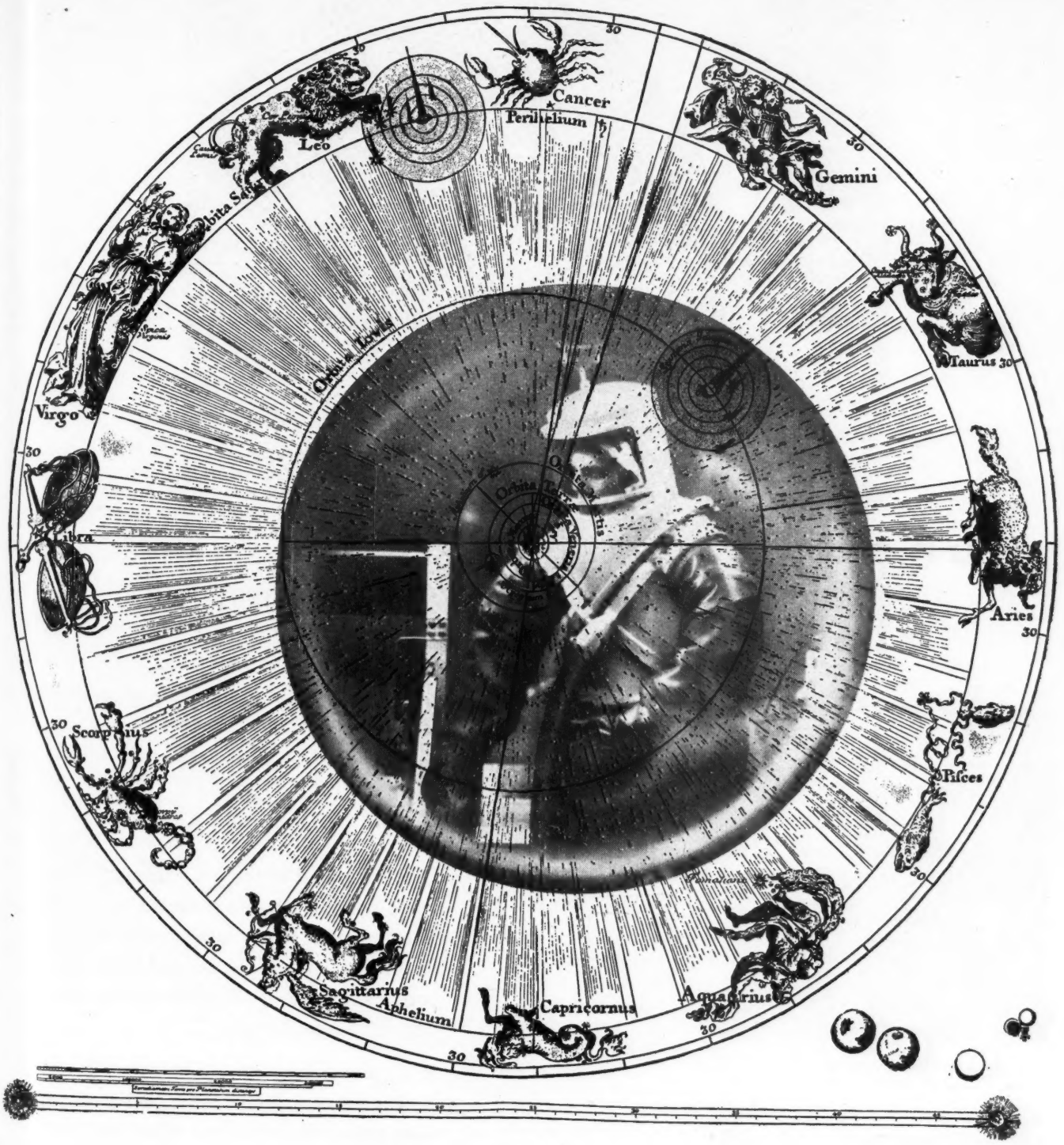
The Act provides that the three [armed services] departments "shall be separately administered," but also that the Secretary shall have "direction, authority, and control" over them. His authority could be simply clarified by applying the procedure imposed elsewhere in the Executive branch whereby "all functions of all agencies and employees within a department, are transferred to the Secretary."

The "weaknesses" of the present act "stem from (a) excessively rigid statutory prescription of functions; (b) rigid statutory composition which makes the agency, in effect, an interdepartmental committee; and (c) the requirements . . . that each agency perform functions inappropriate, if not actually impossible, for an interdepartmental committee to perform effectively and expeditiously."

An "important issue compromised" in the act is the position of the Joint Chiefs of Staff. The President and his civilian subordinates "clearly must have the proper military advice." . . . But by their very makeup "it is extremely difficult for the Joint Chiefs . . . to maintain a broad, nonservice point of view. . . . Each wears two hats. . . ." Their functions should be "redesigned and clarified so as to confine them exclusively to planning functions and the review of war plans in the light of new weapons and techniques." The remaining military functions "should be transferred to . . . the Secretary to provide him with a combined military-civilian staff, responsible only to him and through him to the President."

This would aid the Secretary "in resolving service conflicts . . . and matters involving budget policies, procurement, logistics, manpower, personnel, intelligence, etc." Provision should also be made that in time of war there be a "unified command established by the Secretary to report as directed by him and . . . receive orders by his direction."

"The above," Mr. Krock then wrote, "gives an idea of part of the problem as it was in 1952 and still is, and a glimpse into the mind of one of the ablest administrators of the public service in recent times."—END



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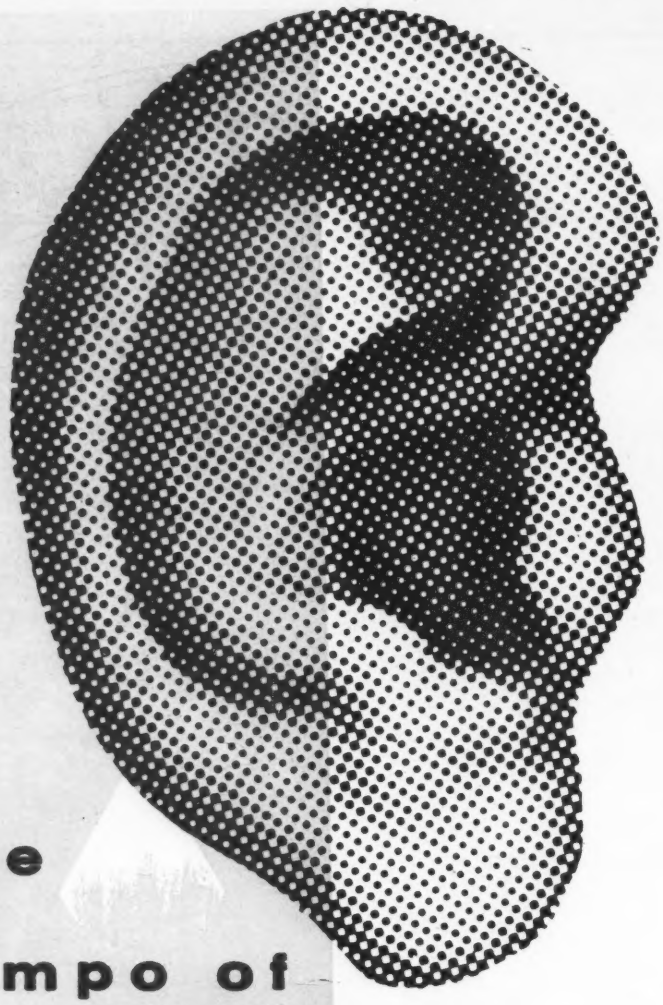

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Gen. O. P. Weyland (right), TAC Commander, congratulates SAC Capt. Robert E. Sheridan, recipient of the General Electric Air Trophy, presented by AFA President Peter Schenk to Captain Sheridan whose B-47 set a "Three Capitals" record.

AFA Takes Part at KITTY HAWK

ON December 17, the Air Force Association joined forces with the Kill Devil Hills Memorial Society, the National Park Service, and the US Air Force, to pay tribute to the Wright brothers on the fifty-fourth anniversary of their first powered flight at Kitty Hawk, N. C.

AFA President Peter J. Schenk, Gen. O. P. Weyland, Tactical Air Command Chief, and Conrad L. Wirth, Director of the National Park Service, took turns using a silver spade to turn the first earth for a new $250,000 museum and visitors' center at the base of the dune on which the Wright Memorial Monument now stands.

Immediately afterward, a half dozen Douglas B-66 jet bombers and fifteen North American F-100 Super Sabres roared through the sky overhead in tribute to the two bicycle mechanics from Dayton who, on that gusty day in 1903, flew their flimsy airplane 852 feet in just under one minute.

Wreaths from the state of North Carolina and the city of Dayton then were placed at the foot of the Wright Memorial Monument.

At the luncheon session at the Carolinian Hotel in nearby Nags Head, AFA President Schenk warned against "too much fascination" with unmanned planes and missiles if that fascination "worked to the detriment of our manned bombers."

General Weyland told the audience, "We have seen in the past fifty years a phenomenal growth in aviation, but the advances that are coming will exceed the advances that have been made."

The National Park Service's Conrad Wirth echoed these words and said that the Wrights had "cast a long shadow on the story of man's journey from the unknown of his deepest past to the unknown of a bewildering future."

Mr. Wirth went on to explain that the building of the visitors' center was part of a ten-year program begun in 1956 called "Mission 66," to modernize and expand the National Park system so that throughout the US an estimated 80,000,000 visitors may be accommodated by the target date of 1966. The Kitty Hawk portions of "Mission 66" are expected to be completed within two years.

Also paying tribute to Miles L. Clark (*see cut*), a leading member of the Kill Devil Hills Memorial Association, Mr. Wirth said, "His efforts have contributed perhaps more than he himself realizes to the commemorative features already here, and to the planning of others we hope to add soon." —END

Ground-breaking ceremony for the new visitors' center: Peter Schenk's turn.

Kill Devil Hills Society's Miles Clark accepts scroll from S. Wade Marr.

WITH THE EDITORS OF AIR FORCE MAGAZINE

SHOOTING THE BREEZE

There have been so many serious comments—and justifiably so—on the post-Sputnik crisis and soul-searching in our country that it's editorial fun to reprint, with the kind permission of the New York *Post*, excerpts from a recent column by their Washington reporter, William V. Shannon. The *Post's* column, purporting to be a statement of counsel to Americans, follows:

(Ed.'s Note: As a service to readers, in place of William V. Shannon, the Post *today presents a guest editorial by Dr. John Faith Crumble, noted news analyst, who tells how to react to a crisis and explains what the ordinary citizen can do.)*

"It seems to be a heartening recognition of the crisis that confronts us that thinking citizens in every walk of life, and also those who ride to work, are asking—What can we do?

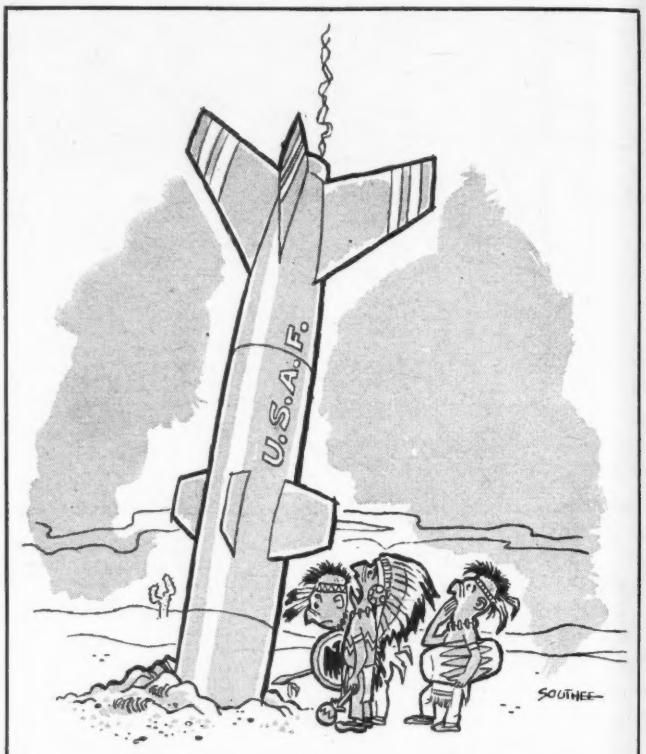
"The first step is solidarity and hard work. We must stand shoulder-to-shoulder and put our shoulder to the wheel. We must pull in our belts, keep our chins up, our eyes on the stars, and our nose to the grindstone. This will not be easy, but whoever said freedom came cheap?

"Secondly, we must be prepared to make needed sacrifices. The burning question for every man, woman, and child in America is whether we, as a people, have the moral fiber to strip our way of life of non-essentials. . . .

"There is no need to strike a note of despair or accept the defeatist counsels of the prophets of gloom and doom, but we must also remember we cannot have our cake and eat it, too. The proper launching pad for this effort of all-out sacrifice is the grass roots of America.

"Third, we must eliminate needless waste and duplication—as distinguished from necessary waste and constructive duplication. One example is evident to every overburdened taxpayer. We must do away with interservice rivalry, the Number One exhibit in the bureaucratic chamber of horrors. In an hour of crisis, we need less wall-to-wall carpeting in the Pentagon and more wall-to-wall thinking. In these weeks of watchful waiting, we need more pilots airborne and fewer desk soldiers chairborne. In this year of decision, we must see to it that those in Washington who man the watchtower have clear heads, knock heads together, and some heads ought to roll. . . .

"Fourth, we must be alert to the danger but not give way to panic. We must move quickly but not rush pell-mell. We must stand fast but not be rigid. We must have calm faith but not be complacent. We must close ranks but not get in each other's way. Let us never forget that we live in



"One doesn't know WHAT to expect when we do the old rain dance nowadays!"

Night safety for drivers is more assured, thanks to this self-powered taillight, designed by Burgess Battery Co., and eliminating the necessity of wiring into the ignition system for juice. Operated by a self-contained switch, the taillight is powered by the two six-volt batteries in front of Miss Breezecake.

the air-jet-nuclear-missile-space age.

"My fifth and final rule is that now, as perhaps never before, is a time to think and speak clearly. Let the beep-beep of Sputnik sound the death knell of the cliché, the last unreluctant farewell in gobbledygook. Clichés and gobbledygook will not avail us in this hour of travail. . . .

"I am confident that if you, the reader, and your family and friends bear these five simple rules in mind you will have a handy guide on what you as an individual ought to do in the present crisis. You should want no more; you should accept no less. Every man to his post!"

☆

Educational television viewers across the country will soon be seeing a special series of programs dealing with the human factors in space flight. The thirteen-program half-hour series – called "Doctors in Space" – was filmed by the University of Houston under the guidance of the Air Force School of Aviation Medicine at Randolph AFB, Tex.

Experts who will make special appearances on the programs to cover special areas of astronautics include: Maj. Gen. Bernard A. Schriever, Commander, Air Force Ballistic Missile Division; Maj. David G. Simons, USAF doctor, who recently ascended nineteen miles in a balloon experiment; Capt. Iven C. Kincheloe, Jr., USAF pilot who has flown higher (126,000 feet) than any man in history in the rocket-powered Bell X-2; Dr. Albert G. Wilson, astronomer and specialist on the problem of life on other planets; and Krafft A. Ehricke, rocket designer at Convair who has worked on the Atlas ICBM project.

Seen on each of the programs as co-hosts are Dr. Hubertus Strughold, Adviser at the USAF School of Aviation Medicine, and Dr. John Rider, professor of physics at the University of Houston.

The project was financed by the Ford Foundation and scripts were prepared by former *Time* magazine editor Gordon Peyton, who is chief of Information Services at the School of Aviation Medicine.

☆

As an AFA delegation prepared to board a bus from down town Washington for their flight to the Kitty Hawk Wright Day memorial ceremonies ***(see page 37)*****, they discovered the bus battery was dead. By some miracle, the first passing car had a jump cable. The delegation recharged the battery, and by the time the bus driver came back from phoning for help, the bus was ready to go.—END**

Flyers Agog at Spectacular New Terminal

Luxuriously-furnished main lobby features oak paneling, terrazzo floor, colorful view of ramps and runways. Adjacent flight ops, rent cars, and restaurant.

The day Southwest Airmotive opened the doors, its new business and military flying terminal became the scene of unrehearsed drama and happy human emotion.

A pretty mink-swathed lady who'd flown into many an airport with her pilot-husband dashed about breathlessly inspecting the plush SAC layout. She summed up everyone's reaction when she sank at last into a deep chair in the lobby and said, simply: "Ahhh-hhhhhhh."

An oldtime executive pilot was overwhelmed by the flight ops room and related etceteras and just frankly couldn't believe it all.

"It's great," he said. "But where's the catch — what'll it cost me to use all this?"

He nearly split his leathery face wide-open grinning when told, "Nothing — nothing at all, podner."

When the manager of the second floor Flight Deck Restaurant first saw the night-time view out his great panoramic window, he sat down almost reverently and said, "Where've I been all my life? What a place to eat!"

The top VP of a firm making new business planes cancelled an appointment, spent an hour taking it all in, then observed:

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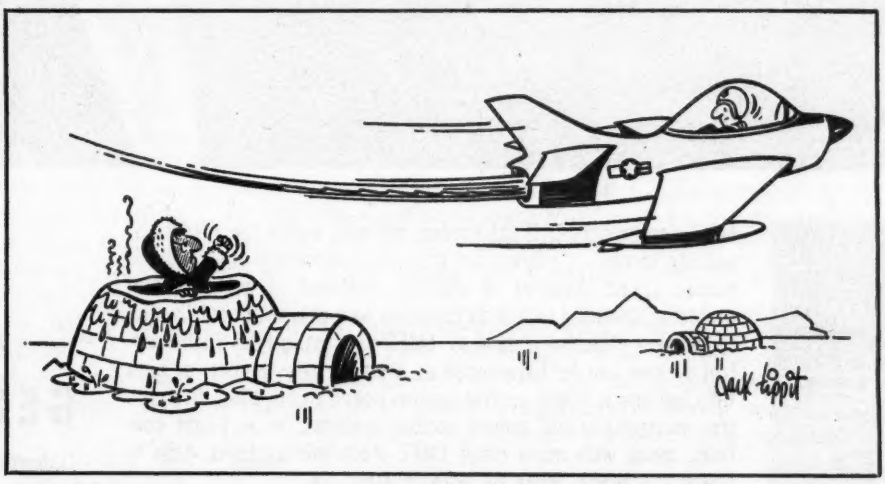

CONTROL

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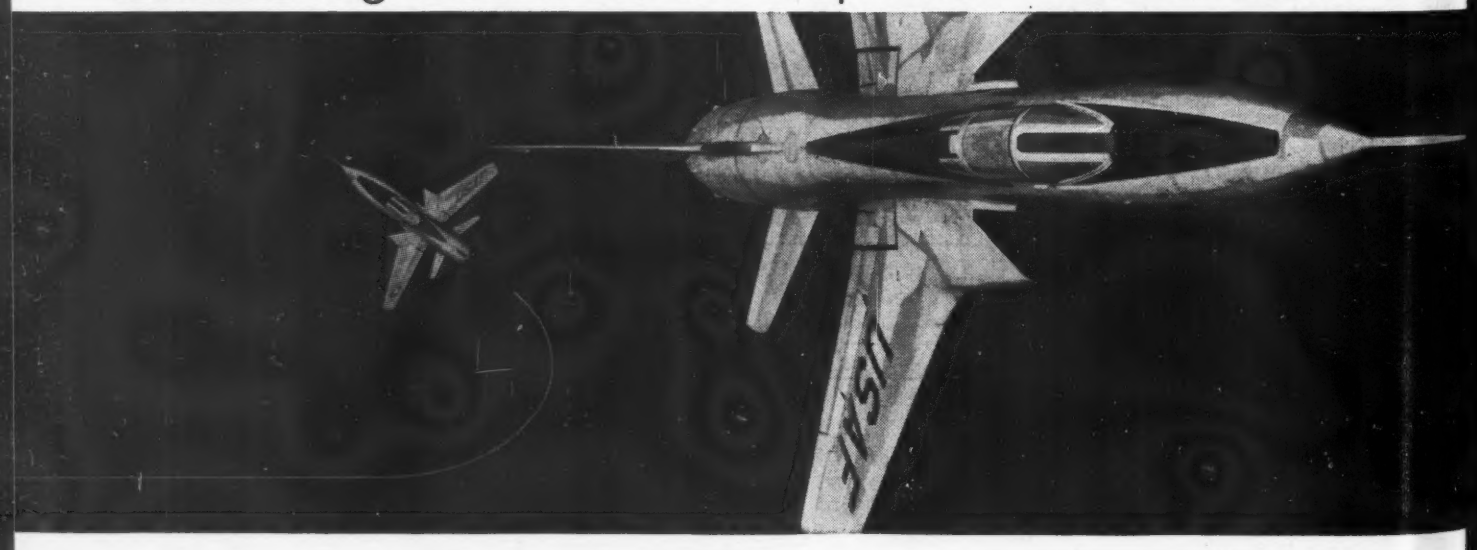

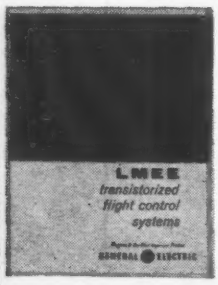

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AIR FORCE
FEBRUARY 1958

NEW PATTERN FOR THE PENTAGON?

TRUE unification of the nation's defense establishment, a long-time goal of the Air Force Association, appears to be closer to realization now than at any previous time. At least there is more talk of it these days, and in influential circles. At the very highest level of the government, President Eisenhower, in his State of the Union speech of January 9, placed his implicit stamp of approval on such a move in these words:

"The first need is to assure ourselves that military organization facilitates rather than hinders the functioning of the military establishment in maintaining the security of the nation. . . .

"Some of the important new weapons which technology has produced do not fit into any existing service pattern. They cut across all services, involve all services, and transcend all services at every stage from development to operation. In some cases they defy classification according to branch of service. . . .

"Recently I have had under special study with the intimate association of Secretary McElroy the never-ending problem of efficient organization, complicated as it is by these new weapons. Soon my own conclusions will be finalized. I shall promptly take such executive action as is necessary and, in a separate message, I shall present appropriate recommendations to the Congress.

"Meanwhile, without anticipating the detailed form that a reorganization should take, I can state its main lines in terms of objectives.

"A major purpose of military organization is to achieve real unity in the defense establishment in all the principal features of military activity. Of all these one of the most important to our nation's security is strategic planning and direction. This work must be done under unified direction. . . .

". . . to end interservice disputes requires clear organization and decisive central direction, supported by the unstinted cooperation of every individual in the defense establishment, civilian and military."

A few years before, when the President was wearing an Army uniform, he said pretty much the same thing in a different way:

"Such unity as we have achieved is too much form and too little substance. We have continued with a loose way of cooperating that wastes time, money, and talent with equal generosity. With three services, in place of the former two, still going their separate ways and with an over-all defense staff frequently unable to enforce corrective action, the end result has been not to remove duplication but to replace it with triplification.

"All this must be brought to as swift an end as possible. Neither our security nor our solvency can permit such a way of conducting the crucial business of national defense."

The Air Force Association went firmly on record in the matter in its 1956 Statement of Policy, which said:

"The three-service system can no longer be tolerated. The goal must be one program for utilizing national resources in the national defense. We must have one defense plan."

(Continued on following page)

To help achieve this goal, AFA that same year called on the other service organizations, and specifically the Association of the United States Army and the Navy League, to join arms with the Air Force Association. Neither has done so; in fact they have opposed any substantial change in the present scheme of things. In so doing, they have obviously reflected the official attitude of the Army and the Navy.

Now it appears that the technological and military challenge of the Soviet Union, as exemplified by Sputniks and missiles, may force the issue. Only a few days before the President's State of the Union speech quoted above, a group of private citizens culminated a fourteen-month study with a thought-provoking analysis of our current military situation together with recommendations as to how better to deal with it. The group was one of seven panels set up in the Special Studies Project of the Rockefeller Brothers Fund, Inc., of New York. A summary of its report appears on the following pages. While reorganization of the military establishment is but one of the points made, it is a prerequisite to prompt and efficient solution of the other problems posed.

We have no occult powers to foresee how much, if any, of the Rockefeller Group's recommendations will be translated into executive and legislative action. We may have certain reservations as to specific portions of the report. But we think it worthy of most serious study on the part of all concerned with our defense effort. Nelson Rockefeller, chairman of the over-all panel, is also chairman of the President's Advisory Committee on Government Organization. Hence we think it highly unlikely that the recommendations of the study group reported here will differ substantially from those of the "special study" to which President Eisenhower referred. Indeed, this report may well represent the shape of things to come.

—THE EDITORS

WHAT THE ROCKEFELLER GROUP RECOMMENDS

AS the twentieth century nears the end of its sixth decade, America faces a world in swift and often turbulent change. Both within our borders and beyond, enormous transformations—in human aspirations, in the structure of society, in economic development, in scientific knowledge—are reshaping the pattern of existence at a speed without parallel in history. The recurrent shock of our age is the discovery that concepts and patterns of action of a more secure past no longer fit the present reality.

We live in a period which insists continually on choice being made. But choice without purpose leads to paralysis or to fitful and erratic behavior. And power without a sense of direction may drain life of its meaning if it does not destroy humanity altogether. Our problems, therefore, require for their solution not only great effort and skill, but, even more importantly, steadfast conviction. And our opportunities will reflect above all the boldness and vision with which we face the future.

Despite the fact that the work of other panels is still in progress, we consider it appropriate to release this report on international security before the other studies are complete. Power alone will not supply an answer to the challenge of the future. It does offer the prospect that there *will* be a future. A people preoccupied as we are with the tasks of peace is always in danger of confusing its aspirations with reality, of refusing to believe that there may be states which prefer conquest to peace. Because we would prefer to dedicate ourselves to constructive tasks, we need constantly to be reminded that we are in great peril and that we cannot substitute our preferences for our duty.

This report concludes that we can afford what has to be done to insure our security; indeed, that we cannot afford less. We feel that we can achieve the necessary military power while preserving and expanding other elements of our strength, such as health, education, and economic growth. We recognize that this will require great exertion. But although the leadership of a democracy is a far more exacting task than the direction of a police state, the power which is generated by the voluntary effort of a free people cannot be equaled by the reluctant compliance of subject nations.

Developing Power Trends

Our military problem has four aspects:

- We require a growing industrial technological and scientific base in order to achieve a state of continual readiness for the long haul.
- Scientific development and industrial potential by themselves are ineffective strategically if they cannot be translated rapidly into operational weapons. Great importance therefore attaches to two kinds of lead-time: (1) the interval between the drawing board and operational weapon; and (2) the rapidity with which weapons are manufactured.
- At the same time, long-range programs and balance cannot become ends in themselves. However powerful we may be potentially, our strategic effectiveness in any given crisis depends on our active forces supplemented by any quickly mobilizable reserve capabilities.
- But no matter how vast our over-all strength, it may still be ineffective in meeting certain challenges if it cannot be applied with discrimination. Henceforth, the adequacy of our military establishment will be determined by its ability to discharge two distinct though related tasks: (1) to discourage an all-out attack through the existence of a powerful, instantly ready retaliatory force; and (2) to react effectively to limited aggression through the ability to make our response fit the challenge.

Highlights of the Rockefeller Group's Recommendations

The world knows that we would never fight a preventive war. But we and the rest of the Free World must be prepared to resist any one of three types of aggression: all-out war, limited war, and non-overt aggression concealed as internal takeover by *coup d'état* or by civil war.

In order to deter aggression, we must be prepared to fight a nuclear war, either all-out or limited.

At present there are major shortcomings in our posture for both all-out and limited war. Our retaliatory force is inadequately dispersed and protected. Our active and passive defense is insufficient. Moreover, we lack mobility and versatility for limited war.

Basic changes in our defense organization are recommended to correct the inefficiency and duplication of effort growing out of interservice rivalry.

★ The military departments should be removed from the channel of operational command.

★ All of the operational military forces of the US should be organized into unified commands to perform missions which are called for by our strategic requirements.

★ The chairman of the Joint Chiefs of Staff should be designated Principal Military Adviser to the Secretary of Defense and the President.

★ The staff of the Joint Chiefs of Staff should be organized on a unified basis and placed under the control of the chairman.

★ All officers above the rank of brigadier general or equivalent should receive their permanent promotions from the Department of Defense and would become officers of the Armed Forces of the US.

★ The line of operational command should be from the President and the Secretary of Defense to the functional commanders through the chairman of the Joint Chiefs of Staff in his capacity as Principal Military Adviser.

★ The line of logistic command should be from the President through the Secretary of Defense to the secretaries of the three military departments.

★ The Secretary of Defense should be given direct authority over all research, development, and procurement. He should have the right of cancellation and transfer of service programs together with their appropriations. He should also be given a direct appropriation for the conduct of research and development programs at the Defense Department level.

Civil defense must be part of our over-all strategic posture. A program must be undertaken to include a warning system and fall-out shelters.

We must face the fact that a meaningful reduction of armaments must be preceded by a reduction of tensions and a settlement of outstanding issues that have divided the world since World War II.

Starting immediately, defense expenditures must be increased substantially over the next few years. Testimony indicates that current deficiencies in our strategic posture require additional expenditures each year of approximately $3 billion for the next several years. This does not include necessary increased appropriations for mutual assistance and for civil defense. Because we must maintain our present forces as we go into production on new weapons, such as missiles, the cost of military programs will continue to rise until at least 1965.

Among other things, this panel recommends that:

★ Aircraft procurement to modernize existing units be authorized into the 1960s while pressing for the most rapid development of operational intermediate-range and intercontinental ballistic missiles.

★ The SAC base structure be made less vulnerable to surprise attack through dispersion and other protective measures.

★ An accelerated research and development support be provided for such key programs as missiles.

★ Additional troop transport be authorized in the form both of modern aircraft and ships.

★ The program of equipping both surface and underwater ships with missiles of various types be accelerated and additional funds for antisubmarine defense be provided.

★ Military pay scales be raised to retain skilled officers and men.

(Condensed from the report's introduction.—The Editors.)

Four power trends appear to be of particular significance today:

- Weapon technology will become increasingly complex with a corresponding increase in the difficulty of choosing the most effective combination of weapons.
- The rate of technological change will increasingly complicate the tasks of the defense relative to the offense.
- The USSR will continue to gain in over-all military strength, greatly aided by Communist China and some of its other allies.
- The concept of "scarcity" in nuclear weapons will disappear from the calculations of the US, the USSR, and to a lesser extent Great Britain.

It appears that the US is rapidly losing its lead over the USSR in the military race. For perhaps the next two years, we still possess a superiority in strategic striking power and any Soviet attack on us would meet a crushing reply. But our position a year or two hence depends on decisions which must be taken immediately. Unless present trends are reversed, the world balance of power will shift in favor of the Soviet bloc. If that should happen we are not likely to be given another chance to remedy our failings. However, it is emphatically not too late if we are prepared to make the big effort required now and in the years ahead.

Three Types of War

We are confronted by three major threats to our security: all-out war, limited war, and a kind of war new to the twentieth century and highly developed by the Communists—the disguised or obscure war concealed as internal take-over by coup d'état or by civil war.

All-Out War

Of the threats to our security, all-out war is the most overwhelming. It can be defined as an attack of such magnitude that our survival would be directly and im-

(Continued on following page)

mediately at stake. Preparedness for all-out war must therefore be the first charge on our military establishment.

Preparedness for all-out war reflects a combination of three factors:

- A *retaliatory force* so powerful and well protected that, no matter what the scale of the enemy attack, the aggressor must always contend with a return blow which will inflict an intolerable amount of damage;
- An *active defense* which can assure survival of a sizable portion of the retaliatory force and which is able to limit the disruptive effects of an enemy blow on our population and economy to the smallest possible proportions;
- A *passive defense* which affords some protection for our population and our economy.

In looking at the strategic equation for all-out war there is reason for serious concern. Our retaliatory power is imperiled by Soviet advances in the missile field and by the inadequate dispersal and protection of our Strategic Air Command. Our active defense designed against manned planes will have to be redesigned for the missile age. Our civil defense program and that of our allies are completely inadequate.

Limited War

Though all-out war is our greatest danger, it is not our most likely threat. If all-out war becomes our only counter to aggression, the Soviet Union may be enabled to use its strategic striking force as a shield behind which to achieve limited advances, confronting us in each case with the alternative of yielding to what will seem a marginal Soviet gain or of precipitating a worldwide holocaust.

It is imperative that in addition to our retaliatory force, we develop units which can intervene rapidly and which are able to make their power felt with discrimination of versatility. To conduct such a limited war, we require modern sealift and an airlift capacity we do not now possess. Our mobile forces must be tailored to the gamut of possible limited wars which may range from conflicts involving several countries to relatively minor police actions.

Non-Overt Aggression

Our security can be imperiled not only by overt aggression but also by transformations which are made to appear, insofar as possible, as not aggression at all.

It should be our aim to prevent such situations from developing. When they do become acute we may have a choice only between evils. Our security and that of the rest of the non-Communist world will then hinge importantly on our willingness to support friendly governments in situations which fit neither the soldier's classic concept of war nor the diplomat's traditional concept of aggression.

Nuclear Weapons

In dealing with the use of nuclear weapons, we come up against the hard fact that the choice is no longer entirely our own. Whatever we may decide, the Soviet Union may choose to conduct its aggressions with nuclear weapons.

Thus against a nuclear power we must always be prepared to fight a limited nuclear war. Even when we decide to use conventional weapons, we would not dare to do so without a nuclear establishment ready at hand. And in a war in which the Soviet Union is a direct participant,

Members of the Security Panel

Following is a listing of members of the Security Panel of the Special Studies Project of the Rockefeller Brothers Fund, who dealt with the military aspects of security:

FRANK ALTSCHUL, *vice president, Council on Foreign Relations.*

GEN. FREDERICK L. ANDERSON, *former Deputy US Special Representative in Europe.*

KARL R. BENDETSEN, *vice president, operations, the Champion Paper and Fibre Co.*

DETLEV W. BRONK, *president, Rockefeller Institute.*

GORDON E. DEAN, *senior vice president for nuclear energy, General Dynamics Corp., former chairman, Atomic Energy Commission.*

JAMES B. FISK, *executive vice president, Bell Telephone Laboratories, Inc.*

JOHN F. FLOBERG, *Atomic Energy Commissioner. Had served on panel until AEC appointment in 1957.*

BRADLEY GAYLORD, *chairman of the board, Pennroad Corp.*

ROSWELL L. GILPATRIC, *partner, Cravath, Swaine and Moore, and former Air Force Undersecretary.*

TOWNSEND W. HOOPES, *J. H. Whitney and Co.*

ELLIS A. JOHNSON, *director, Operations Research Office, Johns Hopkins University.*

COL. GEORGE A. LINCOLN, *professor, Social Sciences, US Military Academy.*

HENRY R. LUCE, *editor-in-chief of* Time, Life, Fortune.

GEN. JAMES McCORMACK, *chairman of the panel until October 1957, when illness forced him to withdraw; vice president, Massachusetts Institute of Technology.*

FRANK C. NASH, *US delegate to UN General Assembly, presidential consultant on overseas bases study, member of panel until his death in December 1957.*

LAURANCE S. ROCKEFELLER, *president, Rockefeller Brothers, Inc.*

ARTHUR SMITHIES, *Department of Economics, Harvard University.*

DR. EDWARD TELLER, *Professor of Physics, University of California, Berkeley, and associate director, University of California Radiation Laboratory.*

T. F. WALKOWICZ, *aeronautical engineer.*

CARROLL L. WILSON, *president, Metals & Controls Corp.*

nuclear weapons will have to be used almost of necessity.

Even US-Soviet equality in nuclear weapons will not change the fact that nuclear weapons complicate the tasks of an aggressor and reduce the significance of Soviet numerical superiority in conventional forces.

Defense Organization

The major defects in the present organization are inherent in its present structure. They will be further aggravated by the passage of time. These defects are three in number:

1. The roles and missions assigned to the individual military services have become competitive, rather than complementary, because they are out of accord with both weapons technology and the principal military threats to our national safety;

2. The present organization and responsibilities of the Joint Chiefs of Staff preclude the development of a comprehensive and coherent strategic doctrine for the United States. Since each member of the Joint Chiefs except the chairman is the senior officer of one of the military services, its status and morale can never be far from his mind. With the best will in the world he often becomes an advocate of a service point of view rather than an over-all planner;

3. The Secretary of Defense is so burdened with the negative tasks of trying to arbitrate and control interservice disputes that he cannot play his full part in the initiation and development of high military policy.

The following changes are recommended:

- The military services should be removed from the channel of operational command. Freed from their responsibilities for strategic planning and combat operations, the service chiefs and their civilian superiors could concentrate on tasks of management and logistics.
- All of the operational military forces should be organized into unified commands to perform the missions which are called for by our strategic requirements. Each unified command would be a combined force with its own mission and trained to carry out a distinctive task.
- The chairman of the Joint Chiefs of Staff should be designated Principal Military Adviser to the Secretary of Defense and the President. The chiefs of the several services would continue to serve on the Joint Chiefs of Staff but only as advisers to the chairman and with particular responsibility for the areas of logistics, training, and procurement.
- The staff of the Joint Chiefs of Staff should be organized on a unified basis and placed under the control of the chairman. A unified staff under the direct control of the chairman would remove many of the service pressures on the members of the staff. The staff would assist the chairman in his capacity as Principal Military Adviser to the President and the Secretary of Defense in strategic and operational planning.
- All officers above the rank of brigadier general or equivalent should receive their permanent promotions from the Department of Defense and would become officers of the Armed Forces of the United States.

The procedure recommended here would retain the specialization necessary to command specific units and the morale which goes with membership in a service. At the higher levels, however, where the requirement is for an over-all view, the primary loyalty of all high-ranking officers would transcend service boundaries. Since entry into this group would be the goal of most if not all officers throughout their careers, junior officers would know that their future would depend on their ability to take a broad view, rather than on the ability to defend the point of view of their service on interdepartmental committees.

- The line of operational command should be from the President and the Secretary of Defense to the functional commanders through the chairman of the Joint Chiefs of Staff in his capacity as Principal Military Adviser.
- The line of logistic command should be from the President through the Secretary of Defense to the secretaries of the three military departments.
- The Secretary of Defense should be given direct authority over all research, development, and procurement. He should have the right of cancellation and transfer of service programs together with their appropriations. He should also be given a direct appropriation for the conduct of research and development programs at the Defense Department level.

Alliances and the United Nations

The United Nations remains the greatest symbol of man's hope for peace and the most comprehensive organization working toward it. It has proved its ability to act in a number of situations from Korea to Suez. It is an indispensable forum for expressing the hopes of humanity and an effective institution for pursuing agreed ends.

Nevertheless, the Soviet veto and disputes extraneous to the issues can hamstring the machinery of the UN. Until United Nations action is taken we should try to act in concert with the widest grouping of nations attainable as provided by Article 51 of the charter. The system of Free World alliances thus is not an alternative to the United Nations but its complement; it is the only means for collective security where the processes of the United Nations may be blocked or its action rendered ineffective.

Pressure on the Alliance System

Our allies are faced with a situation in which, at one and the same time, the danger of war seems less imminent and the fear of the consequences of war grows greater. In Europe and in Asia, the Communist bloc is steadily improving its military capabilities, including nuclear weapons and delivery systems. The concern—assiduously fostered by the USSR—that the use of even the smallest atomic weapon would involve enormous destruction may weaken the will to resist of many allies, in and out of NATO.

A correlative force contributing to the reluctance of many countries to make a substantial military effort is the growing cost and complexity of modern weapons. In many cases, the ability to resist locally is actually decreasing, while the need for it has become greater than ever.

The United States must therefore make a concerted effort, together with its allies, to develop and implement plans which meet the joint security requirements of *all* partners.

The Free World is faced with a major task of strengthening and reequipping its forces at a time when both rapidly changing technology and, in many parts of the world, decreasing popular support for military programs combine to make the job extremely costly and difficult. It is probable that the United States will have to provide—either directly or indirectly—substantial quantities of equipment needed by our allies, or else see their political stability decline along with their military strength.

(Continued on following page)

The Special Case of NATO

Three factors have been working to undermine the cohesiveness of NATO, which is militarily the most highly developed of our mutual security arrangements.

The first is the Soviet development of a large-scale air-atomic capability. This has led to speculation that the "sword" of NATO—the strategic air forces of the United States and the United Kingdom—may not be unsheathed in the event of Soviet aggression on Europe for fear of a devastating attack on the United States and the United Kingdom.

The second factor is that recent trends in US and British military policy have done much to discredit the NATO effort to build forces capable of resisting locally. Both countries have emphasized the massive deterrent at the apparent expense of forces needed for the local defense of Europe.

A third factor making for instability is the reverse of the above: a tendency on the part of some NATO allies to seek to escape their dilemmas by a policy of disengagement and neutralism. The retaliatory forces in the exclusive possession of the United States and the United Kingdom tend to produce a feeling of impotence inhibiting a major effort.

Fortunately there are two factors which seem to offer possibilities for a viable common strategy.

The first of these is the disaffection in the Soviet bloc, so vividly illustrated in the cases of Hungary and Poland.

The second, and more important, is the availability in quantity of tactical nuclear weapons.

Thus a prime element in the new strategy must be a significant strengthening of the NATO capacity for local defense. The United States must pursue with conviction this task of strengthening the shield forces, for it is equally in our interest to see that a conflict arising in Europe, either by design or by miscalculation, does not inevitably result in all-out war. But however earnest our effort to strengthen the shield forces, it will be unavailing unless our allies are prepared to make a substantially greater contribution.

A corollary of the central problem of establishing an adequate NATO shield is to provide within Europe—controlled by Europeans—an atomic and missile capability that will substantially reduce Europe's dependence on US and British strategic airpower. This is necessary to restore the declining power position of NATO *vis-à-vis* the USSR and give reality to the European sense of participation, which is a basic ingredient of the will to resist.

To accomplish these objectives will require the following:

First of all, we must pool with our allies scientific and technical information and assist in mobilizing the research and development capability of NATO both in the civilian and the military fields.

Second, we must strive for a true military interdependence which closely ties together the United States and the other NATO powers.

Third, we must acknowledge the necessity for maintaining in Europe for an indefinite period a strong contribution to the shield forces.

Finally, we must provide those of our allies that desire them with nuclear weapons and delivery systems, as well as with some of the other complex equipment of modern war.

A step in the direction of these objectives was taken at the NATO Council meeting in December 1957.

Civil Defense

Civil defense will not be easy, and it can never be complete. Difficulty does not mean impotence, however. While it may be impossible to protect the population against the blast and heat of an atomic explosion, protection against radioactive fallout and other contamination appears to be more feasible.

It is possible to state certain general principles in relation to the development of any civil defense program:

- Civil defense must be considered as part of the overall US strategic posture.
- The American people need to be told more clearly the dimensions of the damage that would be inflicted on us by a sudden attack and about the measures to reduce its effects.
- A civil defense program should be integrated with the construction program needed for the normal development of our expanding population and economy.

An effective civil defense program can be separated into three stages:

- To provide warning, where possible, and information about radiological levels.
- Protection against fallout. A fallout shelter program could reduce casualties substantially.
- Protection against atomic blast and heat. A deep shelter program should be carefully studied.

Tensions and Reductions of Armaments

The destructiveness of modern weapons has focused the hopes of mankind as never before on the attainment of a stable peace.

This panel, as all Americans, considers the achievement of a free and peaceful world the primary challenge before mankind. It would be highly irresponsible, however, to raise hopes which cannot be fulfilled or to hold out prospects which on closer examination prove to increase our peril.

We must realize that of all the outstanding issues, disarmament is the most difficult problem to settle directly.

A reduction of armaments is not meaningful unless it contains safeguards against violations of the agreement. But effective control has been complicated by the increasingly rapid advance of technology. Hence no reduction in standing forces, however scrupulously carried out, can protect a nation against a technological development in weapons which drastically changes the strategic balance.

Because a controlled and verifiable reduction in forces has proved so complicated, a major emphasis of disarmament efforts has turned to the prevention of surprise attack.

There is no doubt that the danger of surprise attack contributes to the tensions of the nuclear age. But with evolving technology it is questionable whether aerial inspection will significantly reduce the element of surprise. As the speed of planes increases, warning times will be progressively reduced. And in the age of the intercontinental ballistic missile, which is close upon us, the maximum warning time afforded by even a perfect inspection system will be half an hour, the period of time the missile will be in transit.

This study has considered various suggestions for preventing the catastrophe of an all-out war caused by miscalculation or through the spreading of small wars. It seems doubtful that ground rules for the conduct of limited war could be established. Nevertheless, it would seem wise for the US to include on the agenda of disarmament negotiations concrete proposals to limit such wars as may be forced on us to the smallest necessary dimensions. Even should

the Soviet Union reject our proposals, they would serve to clarify our intentions and make less likely a war caused by miscalculation. Even a unilateral declaration which gave an indication of some of the steps we propose to follow to achieve the goal of reducing noncombatant casualties would give an opponent a strong incentive to follow suit.

The value of unilateral declarations is proved by the experience of World War II. Neither the Soviet Union nor Japan had ratified the Geneva Convention of 1929 with respect to the treatment of war prisoners. Yet on June 27, 1941, the USSR informed the International Committee of the Red Cross of its decision to adhere to the Convention and within a week of the outbreak of the war Japan announced that it would abide by the Prisoners of War Convention. Though violations undoubtedly occurred, this indicates that both countries saw an advantage in projecting themselves before the world as subscribers to rules of war. Clear United States declarations, firmly adhered to, might provide a similar framework for mitigating the consequences of modern war.

Budget

There is a grave reason for concern with respect to the inadequacy of recent levels of military appropriations as well as with respect to the workings of the budgetary process.

Programs of great importance to US security now suffer from insufficient funds. Several reasons have brought about this state of affairs. When the Korean War ended, it was natural that an effort be made to reduce military expenditures. But the execution of the reduction has had serious consequences which did not become evident for some time because of a backlog of unspent appropriations.

Recent military expenditures are insufficient to maintain even our current force levels. And events have made clear the inadequacy of these levels.

Specifically this panel recommends that:

- Aircraft procurement to modernize existing units be authorized into the 1960s. Otherwise a gap in ready forces between the latest type of manned aircraft and the operational stage in ballistic missiles seems inevitable.
- At the same time, we should press for the most rapid development and procurement of operational intermediate-range and intercontinental ballistic missiles.
- The SAC base structure, long out of phase with other elements in its program, be made less vulnerable to surprise attack through dispersion and other protective measures.
- An accelerated research and development support be provided for all key programs, including missiles and advance reconnaissance systems.
- The SAC alert time be reduced.
- The establishment of a retaliatory system based on missile-launching submarines be expedited.
- Our early warning and antimissile defense systems be given greater attention.
- Additional troop transport be authorized in the form both of modern aircraft and ships to provide the mobile units essential for limited war.
- The Army be permitted to speed up the modernization of its weapons and its division structure.
- The program of equipping both surface and underwater ships with missiles of various types be accelerated.
- Antisubmarine warfare requires additional funds.
- Present pay scales be raised to retain the skilled officers and men necessary to an effective and economic military establishment.
- A start be made without delay on a program of fallout shelters and related warning and communications equipment.
- The reequipping of allied forces, particularly in NATO, with modern weapons be speeded up.

The Level of Effort

The above deficiencies in our strategic posture can be removed only by substantially increased defense expenditures. These increases will run into billions of dollars and must rise substantially in each of the next few years. This panel does not possess the data to determine the precise budgetary level. The best testimony it has heard indicates that the deficiencies noted above will require successive additions on the order of $3 billion each year for the next several fiscal years. This figure does not cover the necessary increases in mutual assistance programs and in civilian defense. Because we must maintain our present forces, particularly of manned planes, even while we go into production on new weapons, such as missiles, the cost of military programs will continue to rise with no leveling-off likely before 1965.

The price of survival, then, is not low. This panel is convinced, however, that the increases in defense expenditures are essential.

Conclusion

We like to believe that reasonable men can settle all disputes through good will and compromise and that power should be invoked only as a last resort. We therefore tend to think of diplomacy and force as successive and separate phases of national policy. Unfortunately, the position in which we find ourselves does not permit such absolute distinctions.

Force will not solve the problems of this period but the resolution to use it if necessary may afford the breathing spell in which nations can work out their own destinies without foreign interference. We must not forget that the neutrality of many nations is possible only as long as we are strong, just as for a century and a half the British navy made possible our American neutrality. Many of our most vocal critics would be deeply troubled were the protection of our military strength suddenly withdrawn.

We are engaged in the phase of a global struggle which has come to be known as the cold war. In this report we have tried to set forth measures which we feel are imperative in the interest of national security. We consider them essential if we are to reduce the likelihood of war and to make sure that if in spite of all our efforts war should be forced upon us, we shall not be overwhelmed by it.

The cold war poses a two-fold dilemma: In our desire for peace, we must not overlook the importance of power in maintaining it. But once we have recognized the role of force we must forever beware that it does not become an end in itself. The more drastic the consequences of modern war, the more we must make certain that we are true to the principles the defense of which alone justifies resort to force.

When the security of the United States and of the Free World is at stake, cost cannot be the basic consideration. The cold war cannot be won and a "hot" war cannot be avoided without a major effort. This is clearly not a time for complacency; it is just as clearly not a time for hysteria. What is required throughout the country is an attitude of sustained and informed determination. If this report makes a contribution to the emergence of such an attitude, it will have served its purpose.—END

The world and more will be area of operations for graduates of the US Air Force Academy.

Air Force Academy

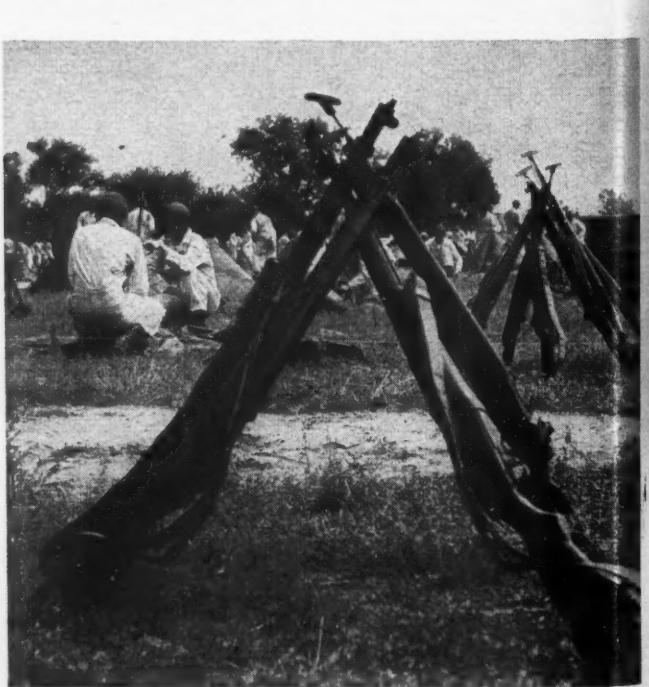
Global Background for Tomorrow's Space Age

The young men pictured here, the cadets of the USAF Academy, are undergoing rigorous training for futures that will extend to horizons staggering today's imagination. Now training at their temporary home at Lowry AFB, Colo., they will soon be moving to their permanent base at the nearly completed Air Force Academy at Colorado Springs, where they will continue the studies that will prepare them for lifetimes of devoted professional national service.

The photographs on these pages were selected from *U.S. Air Force Academy*, a picture story salute to the cadet airmen by Jack Engeman, who has done similar coverages of Annapolis, West Point, and the Coast Guard Academy. Mr. Engeman's book, published at $3.50 by Lothrop, Lee and Shepard, New York, contains a foreword by Maj. Gen. James E. Briggs, Academy Superintendent. The author has had documentary stories in numerous national magazines.

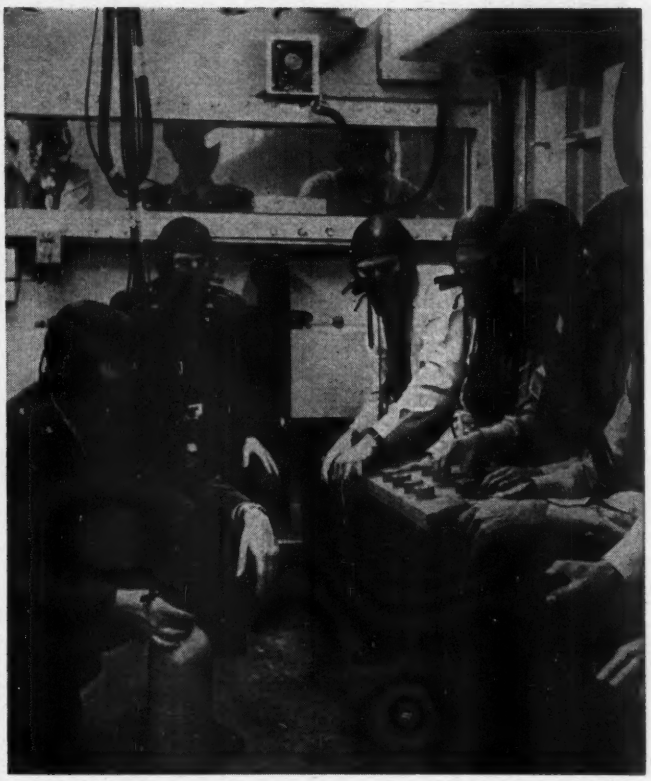
The moment they wait for. Preflight checkout is completed, and the cadet readies for his first ride in a T-34.

Physical fitness and top combat condition are a must, today as always, for airmen. Cadets learn the bayonet art.

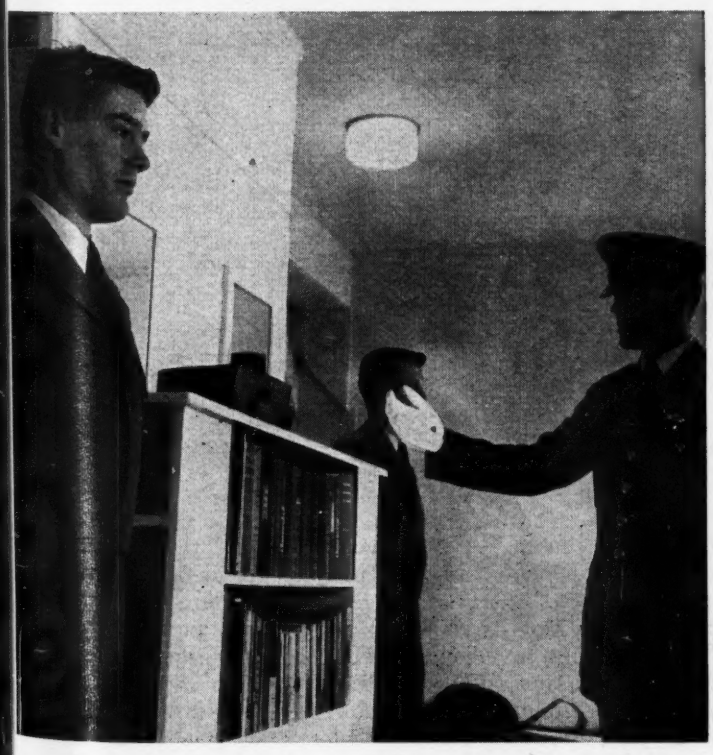


Rifles stacked, field packs are unrolled, and soon the tents will be up as cadets ready for a night in the field.

Navigation is just part of the heavy military science program carried by AF Academy cadets in a packed curriculum.



Cadet reactions to varying altitudes are checked in special chamber, phase of vital Pilot Indoctrination Program.



Perfection, no less, is expected of cadets in living quarters. Above, Senior Officer of the Day makes inspection, checking with his white glove for slightest dust speck.

Global airpower and the solid friendship of allies are on the minds of cadets as they greet RAF College cadets at Cranwell, England, being visited during an "Air Cruise."

NACA aeronautical research scientist visually checks experimental model in small supersonic wind tunnel at Lewis.

NACA

Model Agency for Government Research

A Special Report

NOT long ago, in a private conversation, one of America's top scientists held forth at some length on how to get better results from our research investment and, even more important, how to accelerate our research enough to catch up with the Soviets.

The scientist—and he has no connection with the National Advisory Committee for Aeronautics—referred to NACA as *the* example of how a research organization should be run. What follows is a hard look at NACA to see what makes it tick. The quotations in italics are from the scientist who sparked this inquiry.

"First, you need a potent, independent board of directors... a bunch of wise graybeards who set policy."

The late Karl Compton of the Massachusetts Institute of Technology in 1943 expressed much the same thought when he addressed a group of British scientists. He said NACA was "unique among our federal agencies in that its controlling body is a committee which serves without salary and has been composed of men of such high character and distinction as to render it completely free from political influence."

Today's committee, the NACA's board of directors, is headed by Lt. Gen. James H. Doolittle, the Air Force Association's first president. His outstanding record in uniform is too well known to require mention; so is the long list of speed and distance marks he established back in the twenties and thirties. Less well known is his earned Doctorate of Science degree from MIT . . . which he dismisses with the too modest comment that "I'm no scientist; I'm an engineer." That degree, and that competence in science, helps explain why, in addition to his NACA job, General Doolittle is a member of the Killian Committee, chairman of the Scientific Advisory

(Continued on page 53)

Vertol tests world's first Tilt-Wing VTOL Research Aircraft

The new Vertol 76 is a true Vertical Take-Off and Landing (VTOL) aircraft, an experimental vehicle that casts a large shadow into the future.

With its ability to take off, hover and land like a helicopter it is independent of all but the most rudimentary landing area. Yet it flies from point to point with the dispatch of a turbo-prop passenger plane.

In this pioneer air vehicle the wing and rotor-propellers tilt as a unit through a 90° arc at the will of the pilot. For vertical flight he rotates the wing upward. To fly level he tilts the wing forward. Given a small runway, he can set the wing at the most effective angle to operate Model 76 as a Short Take-Off and Landing (STOL) aircraft and thus increase payload potential.

The Model 76, soon to undergo flight tests, has been developed by Vertol for the Army Transportation Corps and the Office of Naval Research as part of the military's ceaseless quest for greater mobility and efficiency. From flight tests will come experience and knowledge applicable to the bright future of VTOL in military and commercial aviation.

Since 1943 Vertol has been a pioneer in research and development of vertical lift aircraft. It is now the largest independent manufacturer of helicopters. You may find that our know-how, our experienced personnel, our test facilities and our productive capacity can help you solve a problem.

Engineers, if you are not already working for the government or defense industry, investigate job opportunities with Vertol.

VERTOL *Aircraft Corporation*

MORTON, PENNSYLVANIA

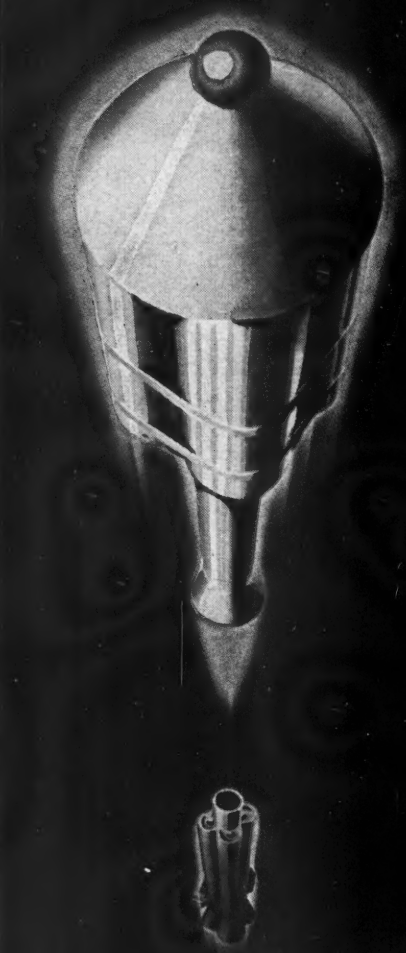
OPERATION **FARSIDE**

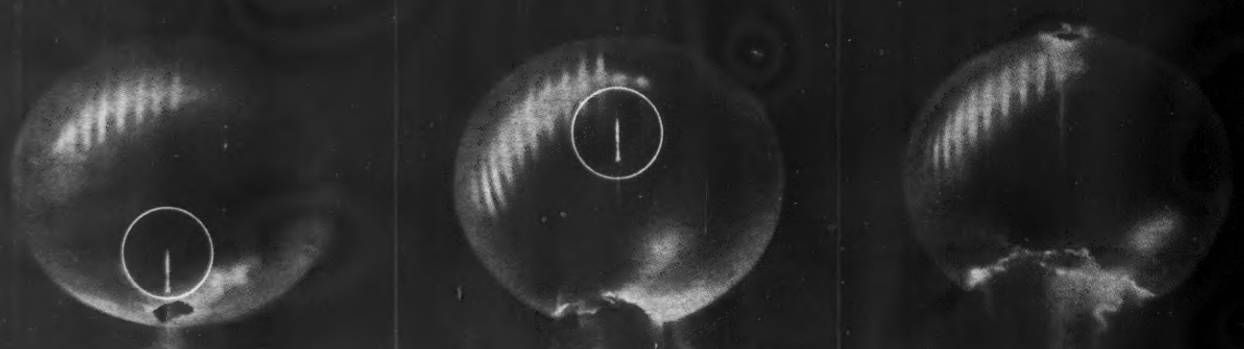
From "off the shelf" to thousands of miles into space

Balloon-carried to 100,000 feet and launched up through the big bubble, the four-stage Operation Farside missile achieved the greatest height ever attained by a man-made object—an estimated 4,000 miles to the edge of outer space.

A cluster of four Thiokol solid propellant Recruit engines supplied the critical first stage take-off thrust, followed by a single Recruit as the second stage.

Farside again emphasized the flight reliability of Thiokol solid propellant rocket engines, whether ground, sea or air-launched. And the five Recruit engines were standard "off-the-shelf" models. The Recruit has been proven time after time for power and performance. Since the engine is a regular production item, precious time and dollars were saved for the Farside project.





Thiokol®

CHEMICAL CORPORATION

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*Registered trademark of the Thiokol Chemical Corporation for its liquid polymers, rocket propellants, plasticizers and other chemical products.

Board of the USAF, and, in addition, works on numerous other government scientific boards and committees. He is also a vice president of Shell Oil Company.

The seventeen members of the NACA committee include two each from the Air Force (presently, Gen. Thomas D. White, and Lt. Gen. Donald L. Putt, respectively USAF Chief of Staff and Deputy Chief of Staff for Development) and from the Navy. There is one representative each from the Bureau of Standards, the Weather Bureau, the Smithsonian Institution, and the Civil Aeronautics Administration. The Undersecretary of Commerce for Transportation, and the Assistant Secretary of Defense for Research and Engineering are also members.

Currently, members from private life include Preston R. Bassett, retired vice president of the Sperry Rand Corp.; Detlev W. Bronk, president, Rockefeller Institute for Medical Research, and former president of Johns Hopkins University; Frederick C. Crawford, chairman of the board, Thompson Products, Inc.; Jerome C. Hunsaker, MIT; Charles J. McCarthy, chairman of the board, Chance Vought Aircraft, Inc.; and Edward V. Rickenbacker, chairman of the board, Eastern Air Lines, Inc.

"The board should be interested in the fact that 500 projects haven't panned out, but they shouldn't be interested in individual projects. . . . They should have the power to hire and fire the director, but they shouldn't be concerned about hiring and firing other staff people."

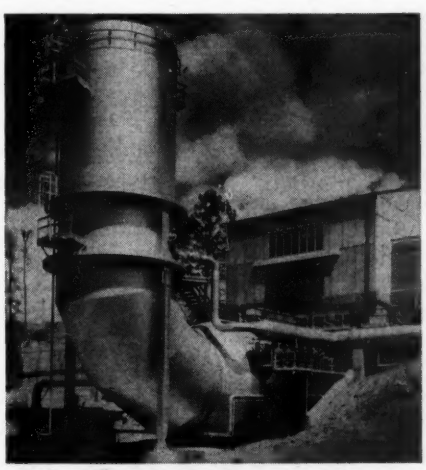
The seventeen members of the committee meet monthly, with an attendance average that compares creditably with the most strictly run industrial "board." They set policy. They plan in broad outline research programs to be carried out by the 7,900 scientists, engineers, and other people who make up the staff of the agency. They hire, and can fire, only three people from among these 7,900 paid members of the staff—the director, Hugh L. Dryden; the executive secretary, John F. Victory; and the associate director, John W. Crowley, Jr.

"The NACA knows more about almost anything in aeronautics than almost anybody. . . . Of course, there are innumerable exceptions about particular facets, but I'll stick to my statement."

One reason why NACA knows so much about so much in aeronautics is that since 1915 one of its major tasks has been coordinating aeronautical research in the US. Through the membership of the main committee and its twenty-eight technical subcommittees, NACA links the military and civil government agencies concerned with the problems of flight. More than 400 men are selected for such committee service, for reasons of technical ability, experience, and recognized leadership in a special field. They serve without pay, in a personal and professional capacity.

Earth "sub-satellite" is displayed by the man who conceived it, NACA's W. J. O'Sullivan, Jr. Aloft, sphere is expected to supply valuable atmospheric data.

Take a look at the newest of these groups, the NACA Special Committee on Space Technology, which General Doolittle's main committee established at its November meeting. It was not until early this year that it was possible for the man they wanted to head the new committee to rearrange his already heavy public service commitments, and agree to serve. He is H. Guyford Stever, associate dean of engineering at MIT, and former Chief Scientist of the Air Force.



NACA muffler-like scrubber removes exhaust, helps silence rocket work.

The work of this new space committee will be to "assist the main committee materially in coordinating, and bringing into sharper focus and increasing the already substantial effort of NACA on problems of flight beyond the earth's atmosphere." In addition to this special committee, Doolittle has announced a number of new subcommittees will be set up, dealing with specific aspects of space technology.

Perhaps the best way to sum up this coordination aspect of NACA operation is to quote from a statement that is remarkably current even though it was made in 1925. It was made to the Morrow Board in 1925, by Dr. Joseph S. Ames:

"The National Advisory Committee for Aeronautics reports, of course, directly to the President, and I should like to take this opportunity of emphasizing what have been to my mind the reasons for the great success of the committee, because the committee is a success.

"Around our table meet the members of the executive committee and the subcommittees, including representatives from all the government services involved. We are really a service department. We work for all the departments of the government.... We are really a coordinating body. And that function would be impossible if our organization were to be transferred to any executive department as such, because if our committee were to be a part of any depart-

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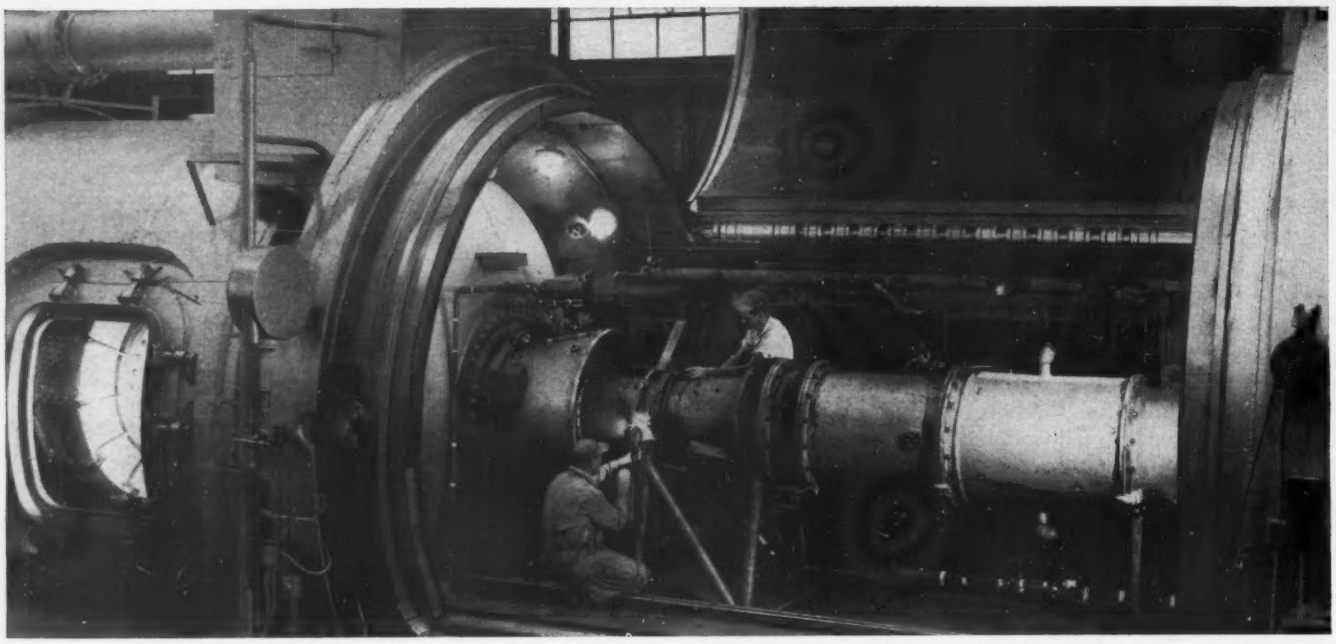

Bomarc missile ramjet being installed in one of the two large altitude chambers in the Lewis Propulsion Laboratory.

ment it would necessarily follow that the aeronautical needs of that department would be primarily served, and it would be very difficult to secure a candid and free interchange of opinion. . . . We think that in our independent existence we offer a wonderful opportunity for serving all the departments, which we think we do in fact. . . ."

"A research outfit should know what it's doing, and stick to the job. . . . There are dangers in looking too far ahead. . . . You can't ever tell too much beyond two years . . . but you've got to have the guts to get out of some fields and into new ones. . . ."

The people at NACA certainly would agree with the comment that research programs should be planned carefully and then carried out as vigorously and as rapidly as possible. Also, they would buy the idea that "there are dangers of looking too far ahead," but here they would point out that a great many research programs take much longer than two years from time of conception to time of completion.

This, in no small part today, is because it has become so difficult to duplicate, in the laboratory with necessarily precise control, the extremely high temperatures and other conditions of hypersonic flight through and beyond the atmosphere. The big effort for years has been to determine how to build the research tools for study of such problems. Only recently has it been possible to design and build pilot models of such equipment. With these the soundness of constructing the expensive, radically new equipment so necessary for rapid expansion of the limits of our knowledge has been demonstrated.

On the other hand, sometimes it is possible to perfect and improve a research technique so as to extend its usefulness. At Wallops Island, off the coast of Virginia, NACA has been shooting rocket-powered models for a dozen years. At first, the speeds attained enabled study of aerodynamic and structural problems in the transonic range. Then the work was pushed high into supersonic speeds. For the past several years, most of the work at Wallops Island has been at hypersonic speeds, up to and well beyond 8,000 mph.

As for the courage to get out of some fields and into new ones, this quality has been demonstrated by NACA. Early in World War II, just as it was completing a complex of expensive new equipment for use in studying problems of reciprocating engines, NACA decided to cut off, right at the root, research on piston engines and to concentrate on turbojet problems. Fortunately, it was possible by relatively minor modifications to put the new facilities to work on the new type engines.

Right now, NACA is certainly reevaluating its research programs to see which should be dropped or deemphasized so that more manpower and funds can be focused on the increasingly urgent problems of space flight. These decisions may be difficult, but they must and will be made.

"You need a bunch of bright guys insulated from political and economic pressures. . . . The unrealistic, uncompetitive salary schedule of Civil Service is a millstone around NACA's neck. . . ."

Split that one into its several parts. So far as "bright guys" are concerned, NACA has them. Take R. T. Jones. Recognized as one of the nation's most brilliant aeronautical theoreticians, Jones doesn't have a formal degree, although he was immersed in advanced aeronautics at Catholic University, Washington, D. C., at the same time he was running an elevator in Congress. He wanted to work for NACA; somehow, the red tape was unsnarled and he got a job. What he is now doing is heavily classified, but it can be recalled that in 1945—independently of the Germans—he came up with the sweptwing theory for high-speed airplanes.

Or take Dick Whitcomb who developed the area rule, leading to the "Marilyn Monroe" shape that reduces the power needed for supersonic flight *(see "The Man Who Put the Squeeze on Aircraft Design," AIR FORCE, January '56)*. Or Al Eggers, who has been pioneering on the problems of boost-glide rockets and man-carrying satellites. Or Ted Oleson, who headed a twelve-year-long, successful effort to develop high-energy fuels, like the boron-hydrides and hydrogen-fluorine compounds. Or Bill O'Sullivan, with his foil-plastic sub-satellites. Or Irv Pinkel and his work on crash-fire problems. Or Alex Charters, in whose "light-gas guns" tiny models reach fantastic speeds under enormously high-temperature conditions. Or Charley Zimmerman and his work with "flying platforms." The list is long.

Much of NACA's most fruitful re-

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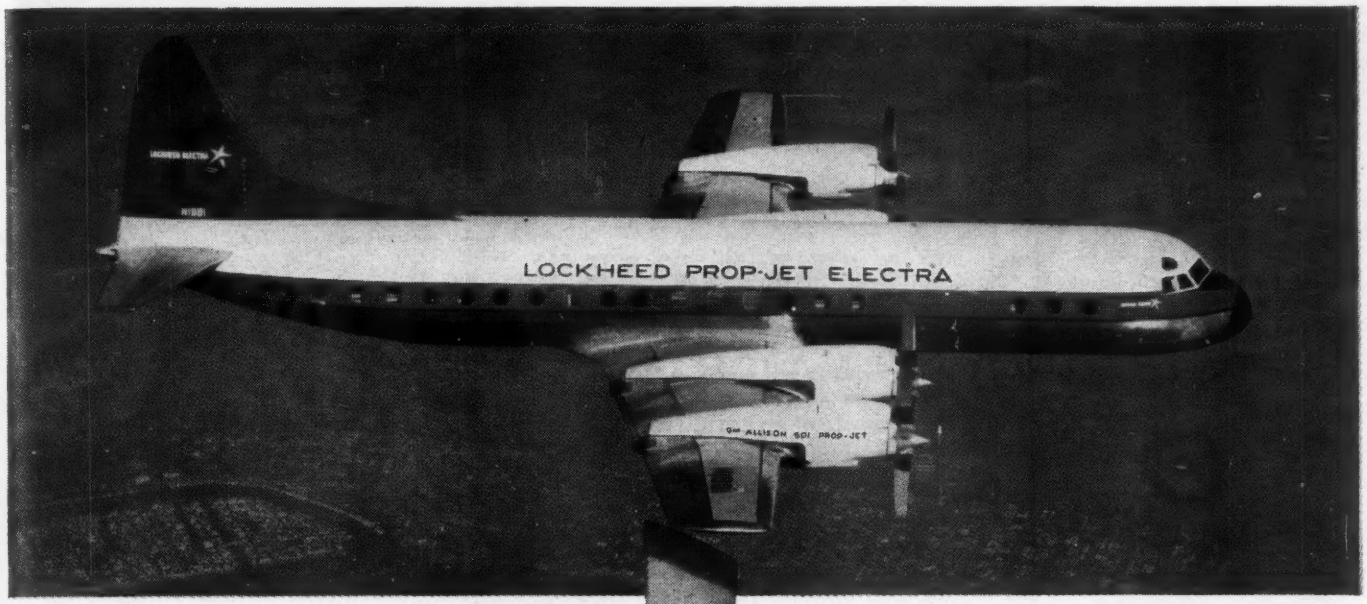


NEW AEROPRODUCTS TURBO-PROPELLER

helps power the new Lockheed Electra into the air 56 days ahead of schedule

Its rugged and durable construction already proved in thousands of flight hours, the Aeroproducts 606 Turbo-Propeller is now demonstrating in the Lockheed Electra why it is the first choice of ten airlines which have ordered this new prop-jet airliner.

Since its first flight – made 56 days ahead of schedule–the Electra has been underway on a flight-test program preliminary to the start of rigid CAA qualification tests. In its instant response to the power of the Allison 501 engine; its ability to provide maximum thrust for fast take-off after short ground runs and its blade efficiency for smooth economical cruise – the Aeroproducts 606 Turbo-Propeller is showing why the propeller *plus* jet is the ideal power plant for medium- to short-range jet-age aircraft.

All Aeroproducts Turbo-Propellers incorporate such advanced design features as hollow steel forged blades–hydraulic pitch changing mechanism – hydro-mechanical governing system and integral oil supply. And, every Aeroproducts Turbo-Propeller is a completely self-contained operating unit.

Aeroproducts–with a background of millions of propeller flight hours–has more turbo-propeller experience than all other American manufacturers combined. Find out how America's leading designer and producer of turbo-propellers can help add a new high in performance and dependability to your power-plant designs.

Building for today... Designing for tomorrow

Aeroproducts

ALLISON DIVISION OF GENERAL MOTORS • DAYTON, OHIO

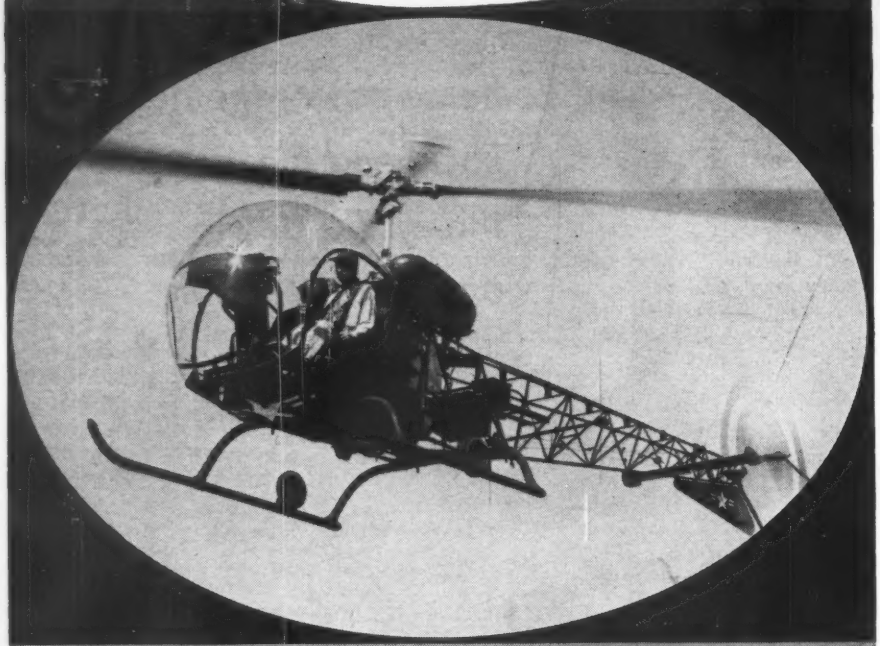
GM GENERAL MOTORS AIRCRAFT POWER

NOW..

1,200 HOURS*

BETWEEN MAJOR
OVERHAULS FOR THE

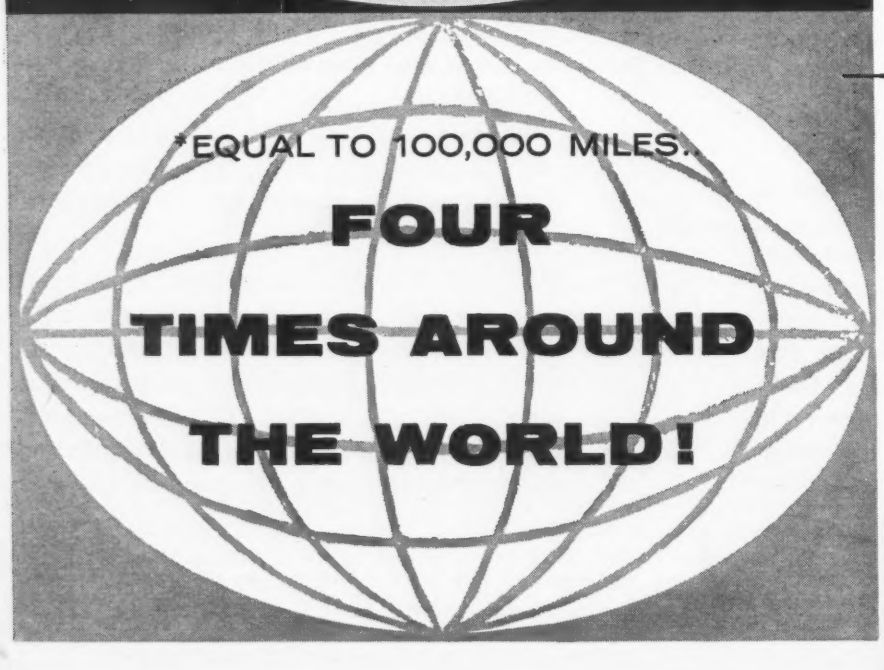
BELL



Bell . .world's most experienced helicopter . . leads again! Because of its outstanding and proven service record, the famous Bell Model 47 series** has been approved for 1,200 hours of operation between major overhauls. This is twice the previous interval . . more than any helicopter.

This means a substantial reduction in maintenance hours, plus greater availability and use of the helicopter. It means that one man can do the work of two on minor inspection and repair.

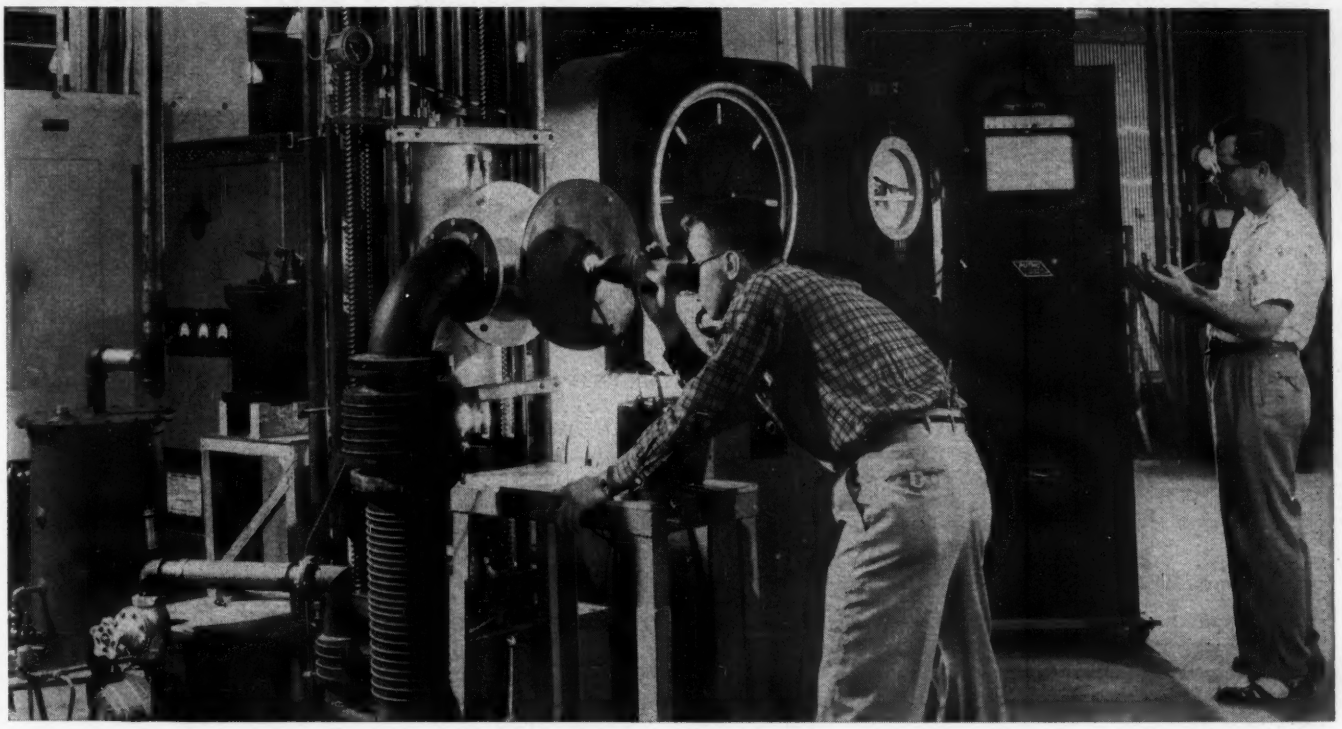
Bell helicopters have passed the test of time with more than 2,500,000 hours of actual flight time in 52 countries of the world. Now, with time between major overhauls doubled, Bell proves once again that it is the undisputed leader in the field of utility helicopters.



**Bell Model 47 series helicopters approved for extended operation include the 47G and 47G-2. Military versions of these models are the Army and Air Force H-13G's and H-13H's and the Navy HTL-6's.

BELL Helicopter CORPORATION

FORT WORTH, TEXAS



The tensile strength of metals and ceramics is tested at temperatures as high as 4,000 degrees Fahrenheit by NACA.

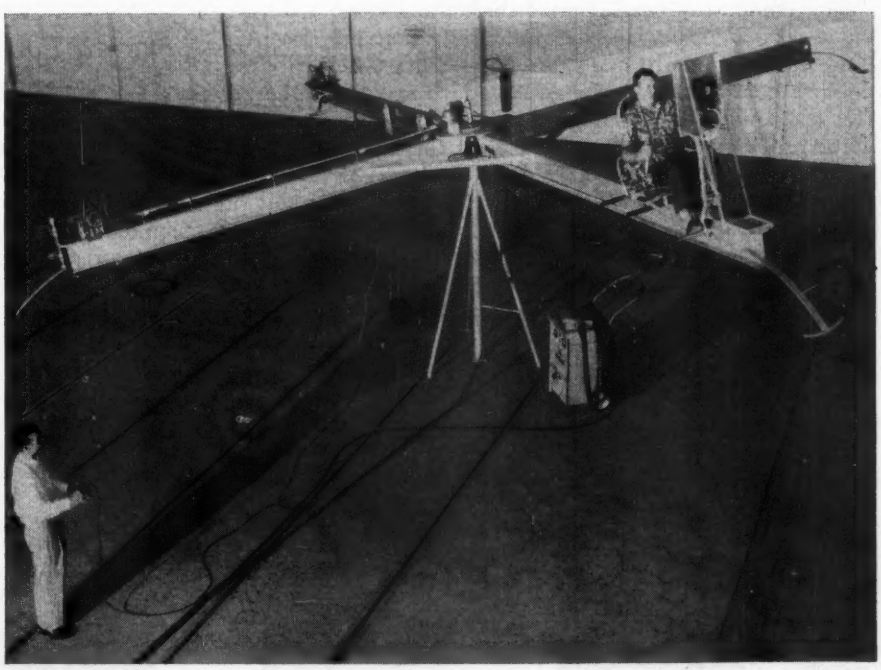
search has been the result of effective teamwork by many men. The pioneering with rocket-powered models at Wallops Island is one such example. Another is the mass of work, ten or so years ago, that resulted in development of successful afterburners for turbojets. A third would be the continuing effort—reflected in the design of our most modern fighters and bombers—with research airplanes.

The matter of "political pressures" can be disposed of quickly. The operation of the entire agency, from the unpaid, presidentially appointed main committee on down, is non-political in deed and in thought. Probably the best way *not* to get ahead in NACA would be for a man to attempt to exert political pressure.

Finally, there is the problem of Civil Service salary schedules. It is doubtful whether the agency will ever say, at least publicly, that it is a "millstone around NACA's neck" because that isn't the way the outfit talks. Instead, NACA describes its personnel problem this way:

"More teams of talented young men competent to work in the new scientific fields are urgently needed. This requires a realistic approach to the pay problem. The attractiveness of public service has been critically deprecated by private industry offering salaries and 'fringe benefits' far greater than the NACA is allowed by law to pay. We do not quarrel with the salaries paid by industry. We must, however, not only provide additional fringe benefits, but also offer rates of compensation sufficient to recruit, and to hold, the scientists and engineers to perform the fundamental research that governs progress." In fiscal 1955, the turnover of scientists at NACA was 8.1 percent. In fiscal 1956, it was 12.7 percent, and in '57, 13.5 percent.

One of the most brilliant of NACA's researchers is H. Julian Allen, credited with a new concept of nose-cone design leading to solution of the reentry problem. Harv is a bachelor, and so far, he has successfully resisted offers from industry at figures far above his $16,000 NACA salary. His comment is, "I'm a research man. The NACA gives me freedom to work. I'm sticking with them."—END



The "Iron Cross" is a device NACA uses at its High-Speed Flight Station, Edwards, Calif., in the investigation of applications of jet type controls to replace or supplement aerodynamic type controls at extremely high altitudes.

How The SOVIETS Organize Their AIRPOWER

By Dr. Raymond L. Garthoff

THE organizational structure of a nation's air forces is a revealing guide to its strategic doctrines, and the Soviets are no exception.

Their military strategic concepts have broadened in recent years to provide greater importance to the long-range offensive air arm and air defense, and the Soviet air establishment has similarly been expanded. But with this significant development there has not been any lessening of the traditional Soviet attention to powerful tactical airpower for support of ground forces.

But before examining Soviet Air Forces organization, let's examine their Defense Ministry, their over-all armed forces agency. The basic organizational structure of the Soviet armed forces is their unity in a single powerful Ministry of Defense, now under Marshal R. Ya. Malinovsky. The army and navy have previously alternated between separate and unified ministerial representation; the Air Forces have never had cabinet representation. Under the Minister of Defense are a series of "administrations" and "chief administrations." Among these are six major operational commands: the chief administrations of the Air Forces, the Ground Forces, the Naval Forces, the Air Defense Forces, the Long-Range Aviation, and the Airborne Troops. Among the first deputy and deputy ministers of defense are the commanders in chief of the Ground Forces, the Air Forces, the Naval Forces, and the Air Defense Forces. Their functions, however, vary; the commanders in chief of the Naval Forces and Air Defense Forces have a direct operational *command* relationship over all their component forces, including respectively the naval aviation and interceptor aviation components of these commands.

For an organizational summary, three diagrams outline (1) the administrative relationships among the headquarters air forces and the other air force headquarters; (2) the operational subordination of the various military air components; and (3) the internal organization of the air force headquarters.

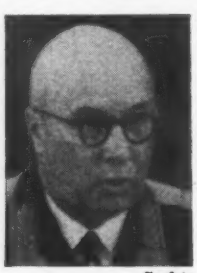
As these charts illustrate, the Chief Administration of the Air Forces (GU-VVS-SA or GU-VVS-VS) and its commander in chief, Marshal of Aviation Vershinin, have very far-reaching administrative responsibilities for the various aviation components of the military establishment, but no operational command over any of the five military air forces. Nonetheless, direct responsibility for the tactical air forces extends directly down to the field level subordination of these forces to Front and Military District ground force commanders. Also, a degree of command over the Long-Range Air Forces may be exercised in practice. Finally, Vershinin represents the air forces in highest level general decisions taken by the Minister of Defense with his Military Council.

The Air Force High Command

The commander in chief of the Air Forces (an office that has existed since 1937) represents all the air forces in the Military Council of the Ministry of Defense, and for certain aircraft and ordnance development and procurement and personnel training. But operational command is limited to the tactical air forces, and this is shared with the corresponding superior Army units in the field. As we have noted, the Long-Range Aviation is an autonomous command, and the Navy, Air Defense, and Airborne Troops aviation components are part of combined commands.

Sovfoto

Konstantin A. Vershinin



Sovfoto

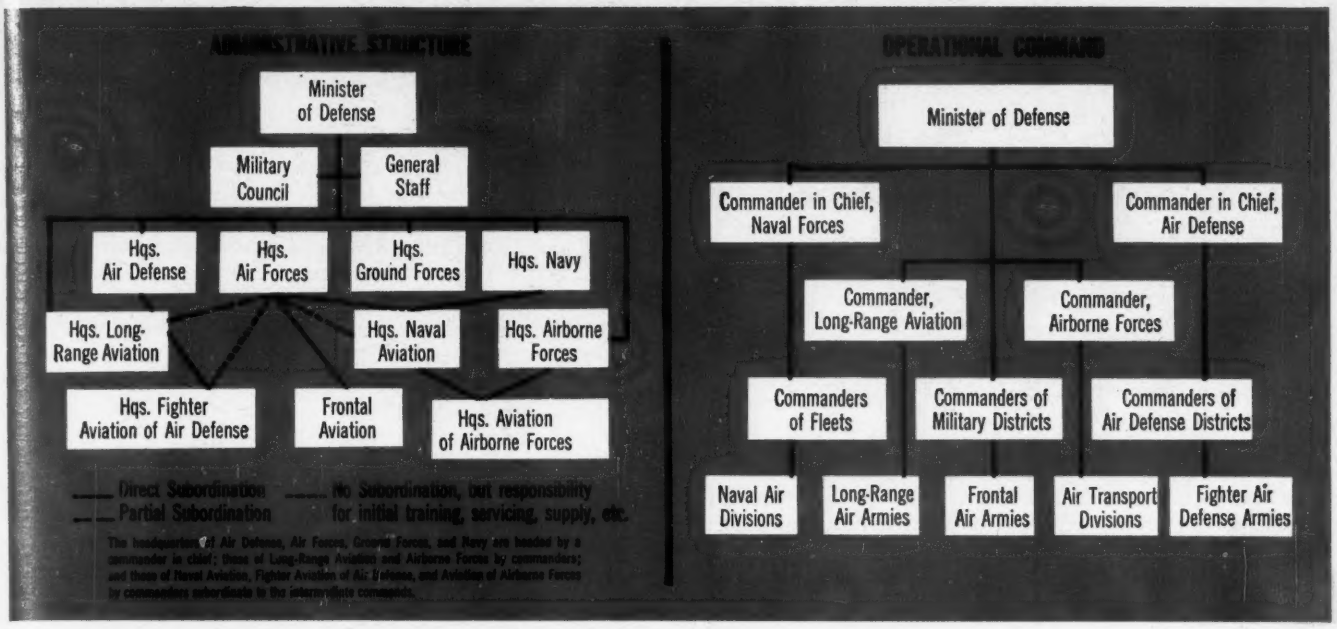
Pavel F. Zhigarev

Sovfoto

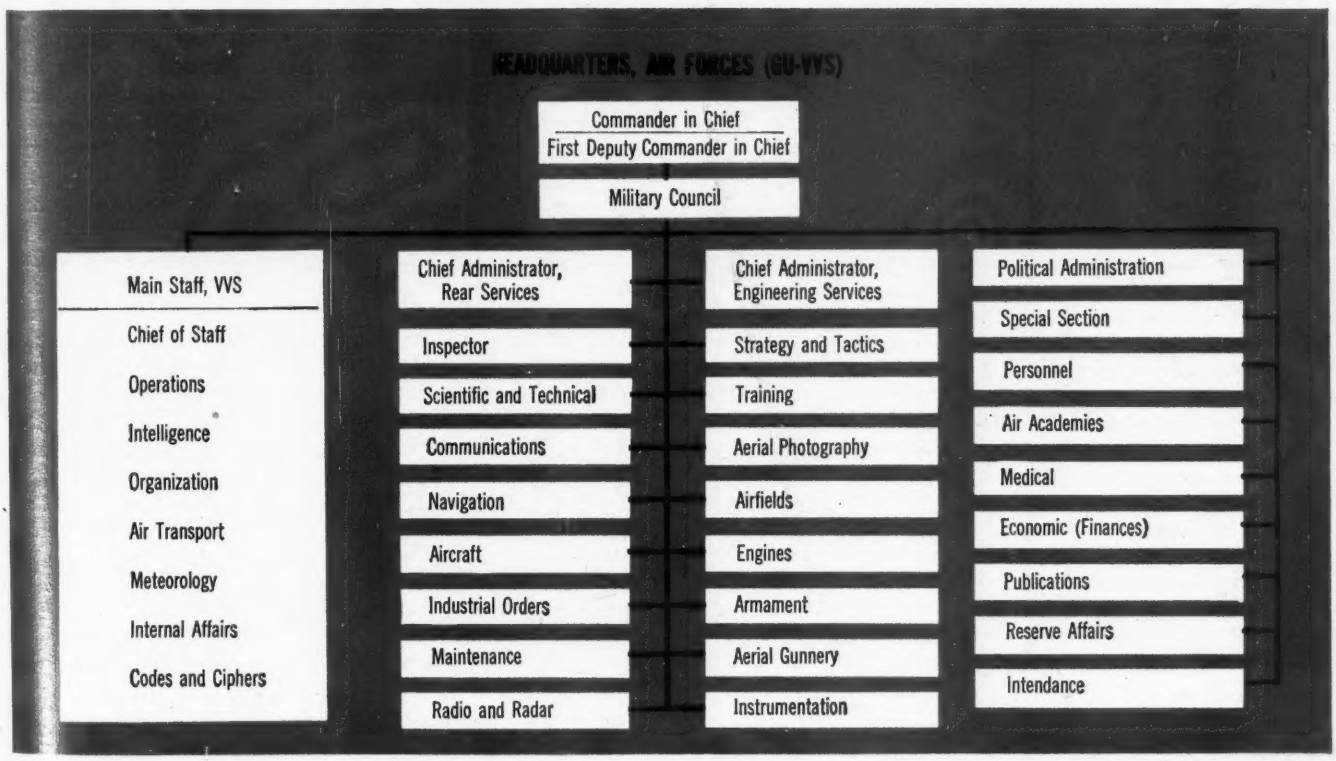
Aleksander A. Novikov

Sovfoto

Sergei I. Rudenko



The chart above illustrates the relationships, on the administrative and operational levels, of Soviet airpower to the Ministry of Defense of the Soviet Union. Also, it points out the various intraforce relationships and responsibilities.



Party influence in the Soviet military is shown here by the spelled-out term, "Political Administration," at right.

The present commander in chief of the Soviet Air Forces is Marshal of Aviation Konstantin A. Vershinin, in the post since January 1957. This is the second tour in office for Vershinin, who occupied the post from March 1946 to July 1949. Chief Marshal of Aviation Pavel F. Zhigarev served in the interim period from 1949 until 1957 (the second tour for him also; he had briefly and unsuccessfully held the office from July 1941 to May 1942). Zhigarev now heads the Civil Air Fleet, and in listings of governmental officials is usually accorded a place higher than his successor despite the evidently lesser real importance of his new post. Chief Marshal of Aviation Aleksander A. Novikov, wartime chief of the air force (from August 1942 until March 1946) was imprisoned, after his sudden relief by Stalin in 1946, until 1953. For a time in 1954 he served as a deputy to Zhigarev, but he is now in retirement. Marshal of Aviation Sergei I. Rudenko has been first deputy commander in chief since 1949, and chief of staff of the Air Force Staff for most of this period.

In addition to Marshal Rudenko, there are about ten "deputy commanders in chief," including the four commanders of the active air combat forces not under Vershinin's operational command, and the deputy who in fact commands the tactical air forces, which are under his operational direction. These five men currently are: Marshal of Aviation V. A. Sudets, commander of the Long-Range Aviation (DA) (and former chief of staff of the Air Forces under Vershinin's earlier tour, from 1946 to 1949); Colonel General of Aviation I. D. Klimov, commander of the Fighter Aviation of the Air Defense Forces (IA-PVO); Colonel General of Aviation Ye. N. Preobrazhensky, com-

(Continued on following page)

Sovfoto

Ye. F. Loginov

I. M. Sokolov

mander of the Naval Aviation (A-VMF); Marshal of Aviation N. S. Skripko, commander of the Aviation of the Airborne Troops (A-VDV); and Colonel General of Aviation Ye. F. Loginov, probably Vershinin's deputy for the tactical, or, as it is now termed, Frontal Aviation (FA). They are all capable and experienced men; Klimov held the same command during the war; Skripko was the deputy chief of the Long-Range Aviation (then ADD); Rudenko, Sudets, and Loginov filled varied command and staff positions; and Preobrazhensky had various naval air commands.

The other five deputies to Vershinin head responsible services of the air forces. One is the inevitable chief of the Political Administration—presently Lieutenant General of Aviation A. G. Rytov. The incumbent chief of the Rear Services is unknown to the author. Colonel General of Aviation Engineering Service I. V. Markov is chief of the Aviation Engineering Service. The chief Inspector, probably Colonel General of Aviation N. S. Shimanov (once chief of the political administration in the air forces), and the chief of Training are the other two deputies.

Among other senior officers in the Air Forces' high command are Colonel General of Aviation I. M. Sokolov, deputy chief of staff; Colonel General of Aviation F. A. Agal'tsov, a former associate of Zhigarev's and for a time chief of staff while Rudenko apparently devoted full attention to being first deputy commander in chief; and Colonel General of Aviation P. I. Braiko, assistant to the commander in chief.

Gone from the scene, retired, are many of the World War II chiefs who rose, and fell, meteorically. In addition to Chief Marshal of Aviation Novikov, his wartime deputies, Marshals of Aviation Vorozheikin, Kudiakov, and Astakhov are all in retirement (as was Falaleev, who died in 1955). Chief Marshal of Aviation Aleksander Ye. Golovanov, head of the Long-Range Aviation from its establishment in 1942 until 1948, is ill. The chief of the Engineering Service during the war, Colonel General A. K. Repin, and the wartime Intelligence Chief, Colonel General D. D. Grendal, are now retired. Several of these men —Novikov, Repin, and possibly Grendal and Khudiakov—fell victim to Stalin's irritations, but they have now at least been rehabilitated into honorable retirement. Chief Marshal of Aviation Zhigarev and Marshal of Aviation S. F. Zhavoronkov, wartime chief of the naval air forces, are now in a sense "retired" from the air forces, as the two chiefs of the Civil Air Fleet, Aeroflot, which has received so much attention throughout the world lately.

What have been the implications of this wholesale change of command? The main elements have been two: first was Stalin's immediate postwar "purge" of the air force high command—paralleling a similar purge of the navy, and a similar but less drastic shift in the army. The causes of this move, beyond Stalin's whims and fears of the victory-flushed military leaders in general, are obscure. The second element was a drive for modernization of the air forces. On this ground, Vershinin was replaced by Zhigarev in 1949—and in turn replaced him in 1957!

Speculations in the West that Zhigarev had personally favored greater stress on long-range missiles seem ill-founded in view of evident Soviet emphasis and achievement in this field, and Vershinin's own comment that strategic aviation is inferior to missiles. But it remains possible that Zhigarev had tried, and failed, to get for the Long-Range Air Force operational subordination of the long-range ballistic missiles (intermediate or IRBM, and intercontinental or ICBM). For the indications are strong that a separate ballistic missile force will be created, since the Soviets consider ballistic rockets to be an advanced *artillery* weapon. It may be that Marshal Vershinin's deputy, Marshal Sudets, will be given a combined one including both ballistic missile artillery and his present strategic bombers; but it is more likely that a combined force will be established in the next year or two under a senior Marshal of the Soviet Union (perhaps the one who is both politically close to Khrushchev and an artillerist, Marshal Moskalenko). This solution would parallel that which has occurred with the other major arm of increased significance: the Air Defense Forces.

The Air Defense Forces

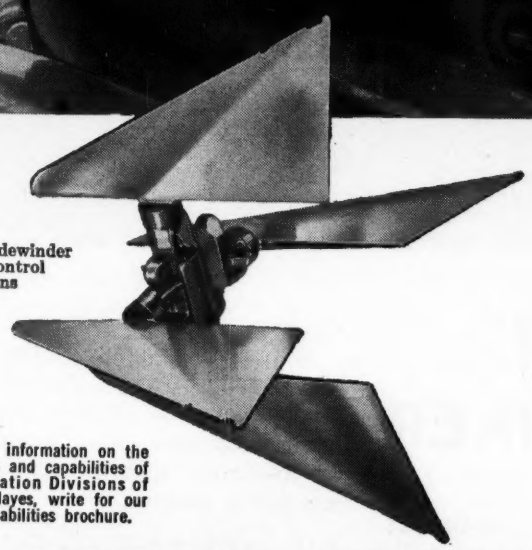
The commander in chief of the Air Defense Forces is a post which has existed for many years, but only recently has it come to be considered to have particularly great importance. During and after the war, the commanders of this force were invariably antiaircraft artillery generals, even though fighter-interceptor aviation had come to be regarded as the main means of active air defense by the beginning of 1946.

In 1954 or early 1955, in keeping with the rising importance of the command, Marshal of the Soviet Union S. S. Biriuzov was named its head, and the Air Defense Forces (PVO) came to occupy a position of rough equality with the ground forces, naval forces, and air forces. The PVO embraces all the components of the active air defense system: the radar and other warning system, the fighter aviation component, the conventional antiaircraft artillery (still retained on a wide scale, in marked contrast to recent US and UK practice), and the new rocket and missile antiaircraft artillery introduced in recent years. Colonel General of Aviation Klimov, commander of the Fighter Aviation of Air Defense, is a deputy to Marshal of Aviation Vershinin and simultaneously a deputy to Marshal Biriuzov. The interceptors are organized in Fighter Air Armies (IVA-PVO), and are assigned to joint air defense districts. These districts overlap and ignore military districts and political subdivisions of the USSR, and are established only in key areas to be defended. The commander of each district is the direct superior for all air defense installations and forces in his district and is directly under Marshal Biriuzov, who in turn is under the Defense Minister. The commander of the key Moscow Air Defense District is Colonel General P. F. Batisty (for much of the period from 1946 to 1953 the commander was Lieutenant General of Aviation Vassily Stalin. Information as to Stalin's son's present role is unavailable.

The Long-Range Air Force

The Long-Range Air Force (formerly *Aviatsiia del'nego deistviia* or ADD; now simply *Dal'naia aviatsiia* or DA) was reestablished in 1946, following a two-year period at the end of the war when it was made the 18th Air Army of the tactical air forces. The long-range bombers which comprise its strength are organized in Air Armies (VA-

(Continued on page 63)



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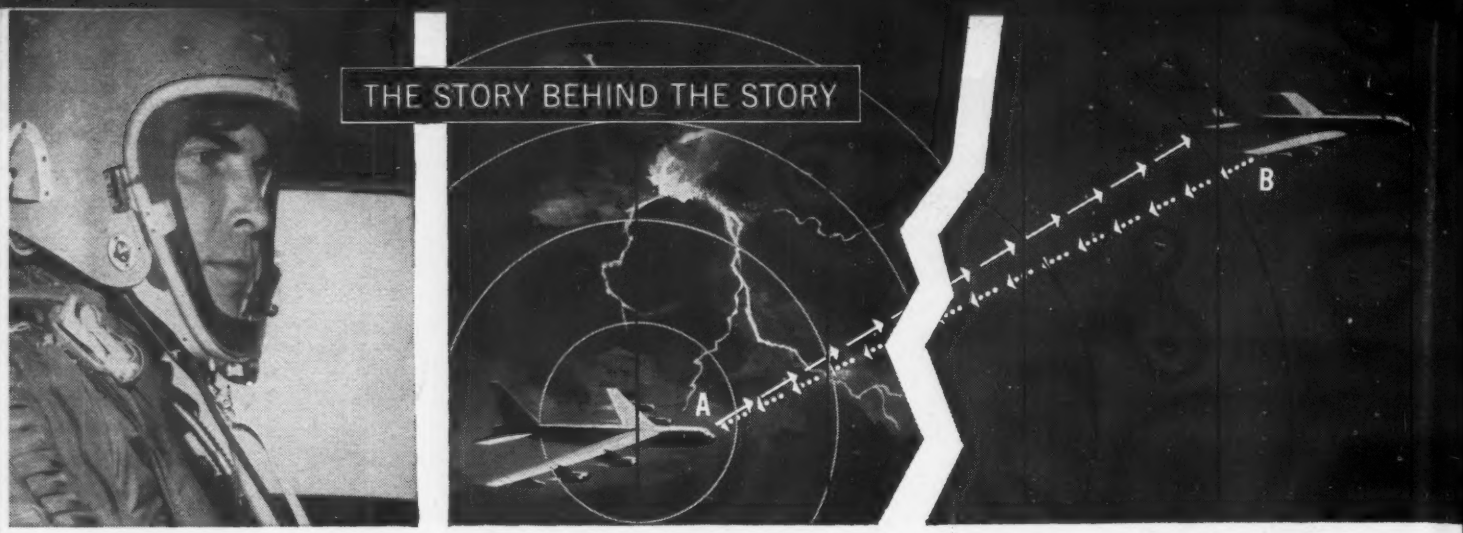
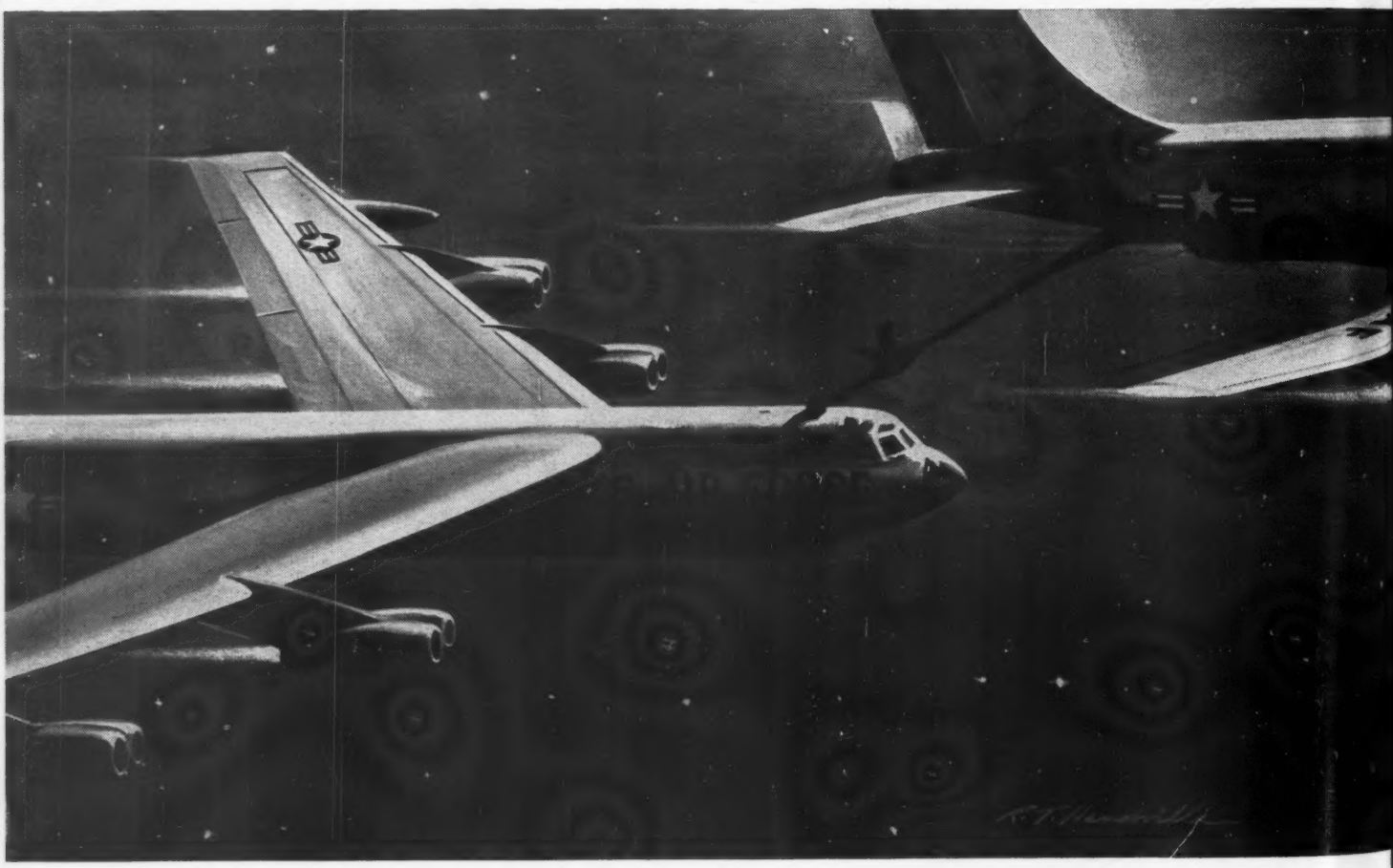


Boeing B-52 pilot, low on fuel, transmits interrogating radar signal in random search for tanker. High-powered signal has extremely long range.

Triggered by bomber's signal "A", tanker plane's Sperry radar beacon automatically transmits coded signal "B". B-52 is then able to identify the tanker and determine its exact range and bearing.

Midnight rendezvous in mid-air is kept after bomber decodes range and bearing from tanker signal. Bomber takes on 600 gallons of fuel a minute.



CODED RADAR BEACON GUIDES B-52 TO JET TANKER

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How to bring them together without alerting the enemy? The answer is the Sperry-developed, high-power coded production for some time, it enables thirsty bombers to pinpoint the position of fuel-laden tankers with hairline precision.

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DA), of which some three or four exist. These are each directly subordinate to Marshal Sudets in Moscow, and he in turn to the Defense Minister. The acquisition of the TU-4 (B-29 type) four-engine bombers in the period from 1947 to 1953 gave this force its first real reason for existence. The subsequent modernization and procurement in large numbers of the twin-jet Badger, four-jet Bison, and four-turboprop Bear long-range bombers has made this force a potent threat to the United States as well as to the United Kingdom and other Western powers. As suggested earlier, the introduction of long-range ballistic missiles may lead to a combined forces organization, possibly entirely independent of Vershinin's air forces. (Submarines equipped for launching missiles against strategic targets may also be taken from the navy and assigned to such a combined strategic striking force.)

Airborne Forces

The Aviation of the Airborne Troops (A-VDV) has been under Marshal of Aviation Skripko since 1950. It is exclusively transport aviation, recently including large helicopters as well as airplanes. The 500 or so aircraft assigned provide a substantial airlift, though they are at present still of relatively small (twin-engine piston) types. They are organized in air transport regiments.

Naval Air Forces

The Naval Air Forces have always been an integral component of the navy, and they so remain. There are no aircraft carriers, nor any planned, in the Soviet Navy.

The fleet air forces are each subordinate to the corresponding fleet commanders (Northern Fleet, Baltic Fleet, Black Sea Fleet, North Pacific Fleet, Pacific Fleet), and under the naval aviation chief in Moscow.

Frontal Aviation

Frontal Aviation is the somewhat awkward title the Soviets have used to rechristen their tactical air forces. More than half of all Soviet military aircraft are in the twelve or more Frontal Air Armies (FVA). Usually a Frontal Air Army includes about three fighter, three fighter-bomber or ground support, and three light-medium bomber air divisions. Thus the total force may be twenty-seven air regiments. One such air army is ordinarily assigned to each Front (Army Group) of the ground forces, to provide cover, support, interdiction, and reconnaissance for the appropriate sector of the front. In peacetime, those military districts designated for activation as fronts in wartime are generally each assigned a tactical air army. The other, especially interior, military districts have an "Aviation of the Military District" to administer such tactical and training air force units and installations within it. All Frontal Air Armies are administered from Air Force headquarters in Moscow, but operationally subordinate to the senior ground force commander (front, group of forces, or military district commander).

Headquarters of the Air Forces

The Chief Administration of the Air Forces (GU-VVS) is composed of the commander in chief, the military council (composed of his senior deputies), the main staff or general staff, the inspector, the chief administrations of engineering service, and rear services, and a host of other subordinate administrations for personnel, aircraft, engines, armament, aviation academies, maintenance, management, navigation, meteorology, strategy and tactics, aerial photographs, airfield servicing, industrial orders, training, communications, medical services, and still others.

The main staff of the VVS (as it is officially called in 1958, although it has also been termed in 1955 the "general staff" of the VVS) is composed of seven sections: operations, intelligence, organization, air transport, meteorological, internal (administration), and ciphers. The work of these sections is generally self-evident. They are in most instances in close touch with the superior general staff of the armed forces (the former general staff of the Soviet Army rechristened to reflect its combined military forces representation and competence).

Thus, the intelligence section is closely tied to the intelligence division of the general staff for many of its sources of information and for coordination. The operations section is responsible for tactical air forces and training forces operations—but within the framework of the joint service program established in the operations division of the general staff (under General of the Army M. S. Malinin). The other sections are more autonomous in their relation to the superior staff by virtue of their duties, although liaison is of course necessary.

The chief administration of the rear services has very wide responsibilities for the whole supply and maintenance function. It is coordinated with the rear services of the Ministry of Defense. The chief administration of the aviation engineering service has important lateral ties with the research and development agencies of the Ministries of Aviation and Defense Industry, as well as those operated by the air forces and under its direction.

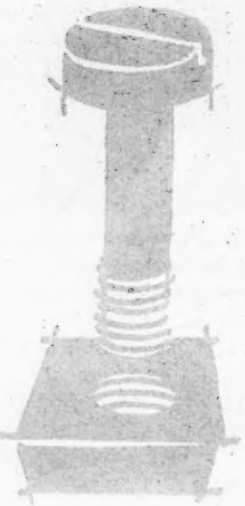
The chief political administration has dual subordination. Lieutenant General of Aviation Rytov is a deputy to Marshal of Aviation Vershinin, and a deputy to Colonel General A. S. Zheltov, head of the chief political administration for the whole armed forces (who, in turn, has dual subordination to Marshal Malinovsky and to the military section of the central committee of the Party). Also, a separate organization with subordination external to the Ministry of Defense is the "special section," which is staffed by secret police counterintelligence officers, a phenomenon indicative of Party influence.

The headquarters of the VVS has occupied approximately the same place, and performed the same functions, throughout the postwar period. Its importance has increased as the importance of the air forces in general have risen in the Soviet military establishment, but it also has reflected the continuing dominance of the ground forces marshals in the Ministry of Defense.—END

ABOUT THE AUTHOR

Dr. Garthoff, long a student of Soviet ideology, spent seven years with the RAND Corp. as a specialist on the USSR. A graduate of Princeton and Yale, he is the author of Soviet Military Doctrine *and the forthcoming* Soviet Strategy in the Nuclear Age. *He wrote "How the Soviets Run Their Missile Program" in our December '57 issue.*

THE FEDERAL CATALOG . . .



New order is emerging in the world's biggest parts inventory as the government assigns uniform stock numbers to all stock items used by the military services

By Louis Alexander

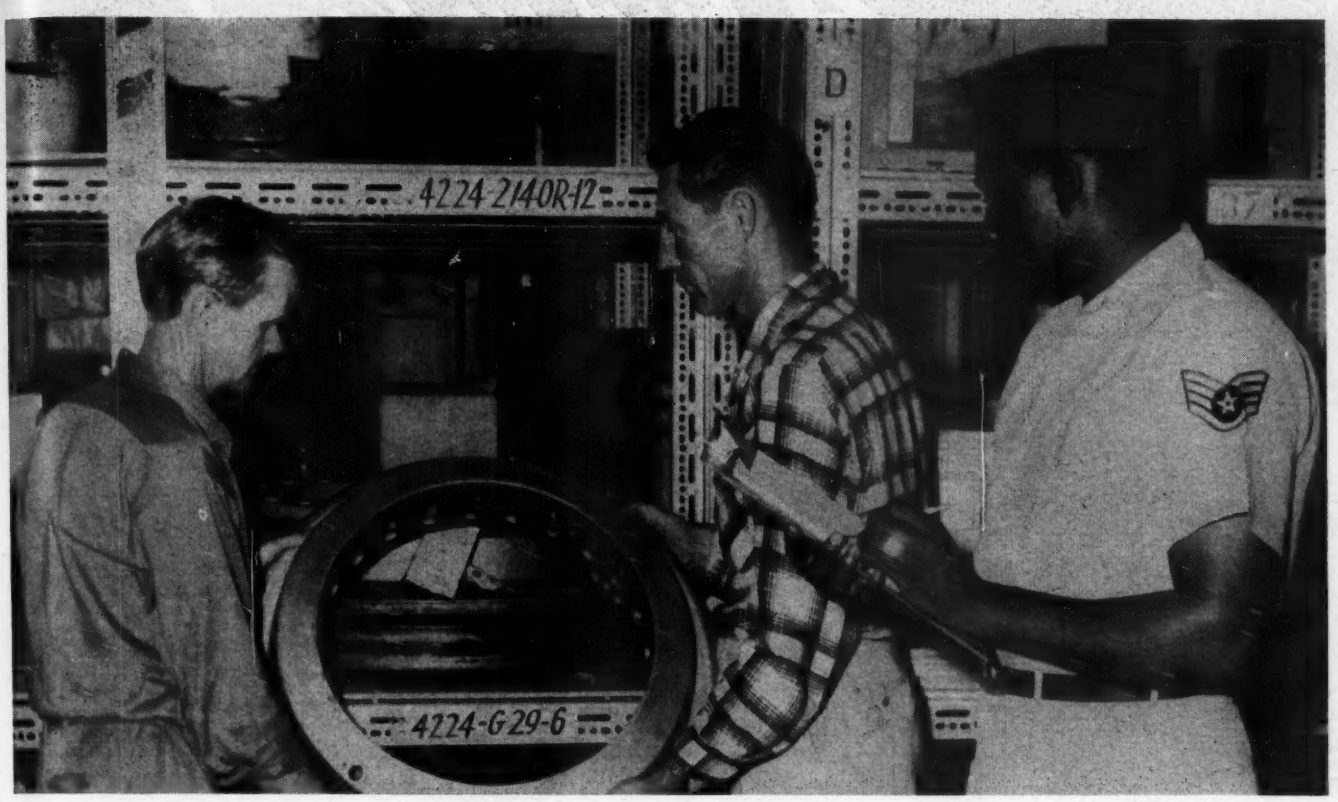
THE operations officer was more than irritated when the status board indicated that three desperately needed B-29s were out of commission for parts—that thorny old problem of AOCP. They would not be available for the crucial Guam-to-Japan mission that night. All that was missing, he knew, was a single, identical radio tube in each plane—inexpensive tubes, costing only a couple of dollars each, but essential to the long-range communications systems of the Superforts. No other tube in the Air Force supply system could replace it.

Months later, after the war had ended, that squadron's supply officer had occasion to screen some surplus items in a Navy warehouse on another part of Guam. He came across several cartons of the very tubes so badly needed that mission night. It took a little research, however, to make sure that they were the same. The cartons were labeled with a Navy stock number, meaningless to Air Force personnel. He broke the seal on one of the cartons and inside found the manufacturer's name and the tube type indicated on the glass body of the tube. Three of these radio tubes would have put three more B-29s over the Japanese homeland that night months earlier.

What happened on Guam happened all over the world during World War II. In every combat theater there were, all too often, "famines in the midst of plenty," simply because of the supply language barriers created by dissimilar stock numbering systems of the various services.

To alleviate this problem and make ready for instant supply service, the Defense Department, since 1953, has been developing a single Federal Catalog system to "name, describe, classify, and number each item recurrently used, bought, stocked, or distributed by the Department of Defense." Only one distinctive number will identify the same item in all military departments. It is called a Federal Stock Number, and is composed of eleven digits. For example, 7430-664-5910 represents an item in Federal Supply *Group* 74 (Office Machines), more specifically located in Federal Supply *Class* 7430 (Typewriters and Office Type Composing Machines). The exact item is represented by the last seven digits of the number, known as the Federal Item Identification Number. Thus, 7430-664-5910 is the Federal Stock Number for a typewriter, nonportable, with upper and lower case characters, an American standard keyboard, eighteen-inch carriage, pica gothic type, forty-two keys. From now on, regardless of the makes of typewriters fitting the above description, and no matter whether Air Force, Army, Navy, or all three have them in their inventories, all such typewriters will be positively identified by the above number. Then, if the item is jointly procured, if assets are transferred from one agency to another, if it appears on an excess item listing, or in any other cross-servicing supply transaction, there will be no uncertainty about any of the characteristics required.

Phases of this Federal Cataloging program include: identification, classification, stock numbering, and conversion. The identification phase began in July 1952, and by December 1956 all the items of supply in the Air Force, Army, Navy, and Marine Corps had been identified, classified, and stock-numbered in accordance with the Federal Catalog system. Then came the job of converting all the items in the inventory to the new catalog data. This meant publishing new stock lists, changing all stock record cards, rewarehousing, preparation of new address plates, printing and applying new bin tags and item tags. The Air Force expects to finish its part of the conversion program on December 31, 1958. As of September 30, 1957, 900,942 line items had been converted, out of an estimated total of 1,299,529. A "line item" is one stock number, even though it may represent hundreds of identical items in the inventory; the total count is described as "population." The aggregate popu-



The wheels move literally as well as figuratively as warehousemen switch parts around during the giant reclassification program that, when completed, will bring new order to the greatest equipment and parts inventory in the world.

lation of Air Force items is *more than a billion.*

As this giant cataloging program advanced, by October 1957 the consolidated files contained identification data on 3,393,065 items. More than twenty percent of these are used by more than one agency, so that the same items would require 4,081,586 stock numbers if each agency cataloged them independently. And those are not static figures—there are about 500 new items entering the Air Force supply system every day. Of course, some items are also becoming obsolete, but at a much slower rate. So the inventory grows and grows, as each new aircraft, missile, or other major item of equipment is adopted, requiring thousands of new spare parts, from huge aircraft tires to tiny machine screws.

Millions of dollars have been spent on the Federal Cataloging program, and spent wisely, and the most advanced automation devices are being enlisted to help do the job. The item identification data that was initially assembled in manual and punched-card files now is being transferred to an automatic data-processing system which was installed about a year ago in Washington. About 10,000,000 electric accounting machine punched cards have been converted to records on magnetic tape. This almost unbelievable machine will take an item identification and determine whether the same item has already been identified, by comparing it with the data stored in the machine's "memory." If it has, the machine will reject the new identification as a duplicate, and indicate the Federal Stock number that has been already assigned to the item. If the described item is indeed a new one, the machine will accept the description, store it within its "memory," assign a new Federal Stock number to it, and issue that number by means of a printed record or a punched card.

This process is so fast that more rapid communications facilities will also be required. All Air Materiel Areas and Air Force Depots will be linked with the Cataloging Division, Office, Assistant Secretary of Defense (Supply and Logistics), in Washington, via a transceiver network, as will the major logistics activities of the other military departments. This will permit instantaneous transmission of punched-card data at the rate of eleven cards per minute per machine. Four pairs of machines may be operated simultaneously, four transmitting and four receiving, over a single commercial telephone line, sending a total of forty-four punched cards per minute with utmost accuracy.

With faster transmission and automatic data processing, it will normally require less than seventy-two hours from the time a depot submits a new item description until it receives a Federal Stock number for the item. That number will identify the item in all supply operations within the Air Force, from procurement to disposal. And if there is any need to indicate the specific item to other military services, in cross-servicing or redistribution of assets, there will be complete understanding of its characteristics.

It's a new way to do the best possible job with the biggest inventory in the world.—END

ABOUT THE AUTHOR

Author of "USAF's New Cessna T-37 Jet Trainer" in last month's AIR FORCE, *Lou Alexander is on the staff of the Houston, Tex.,* Chronicle. *An Air Force Reservist, he teaches at an airport ground school near Houston. He is an active freelance writer, a member of the Aviation Writer's Association, and has contributed to several other periodicals. His work had appeared, before January, in* AIR FORCE *in October '56. Married, he has two children.*

A bird in hand...

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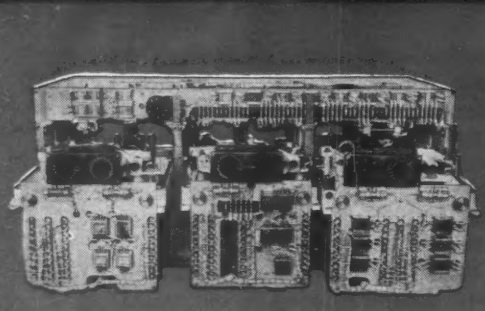

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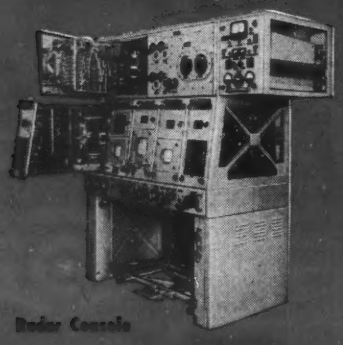

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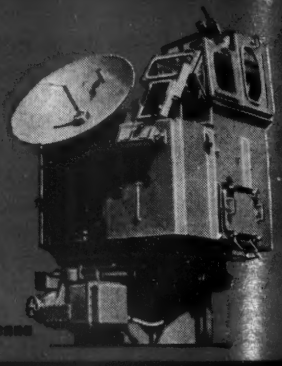

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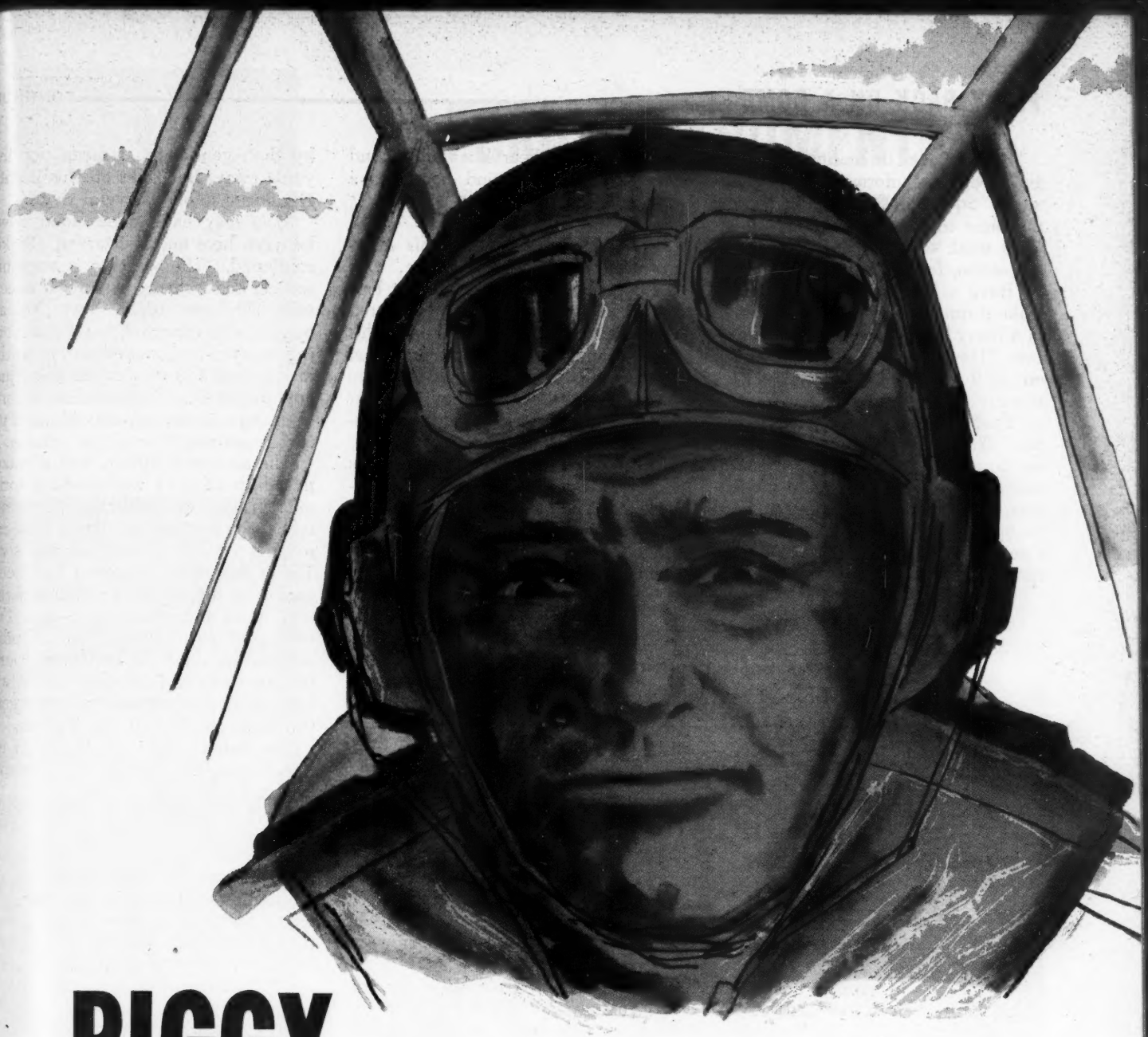


PIGGY BACK on a BOMB

By Warren F. Tolar

"BAKER leader, this is Baker four." Through the dense cloud of white smoke that poured back from the engine cowling, I could see one of the Vultee Vengeance aircraft of my squadron ahead and far above me. I hoped it was the CO. "I've got difficulties of the first water! Can you drop back and have a look?"

The Vultee in front of me dropped a wing and circled back toward me. "Down below you! Almost on top of the mountains!" For some reason, I found myself shouting into the mike. "I caught something over the target area. Engine is very rough and I'm smoking!"

Rough? The engine sounded like an overworked coffee grinder. Cylinder-head temperature was fast heading for the red danger zone. The buffeting against the control column was shattering. There was a giant hole in the left wing. And there were great clouds of smoke. Three hundred feet below were the mountains of Burma.

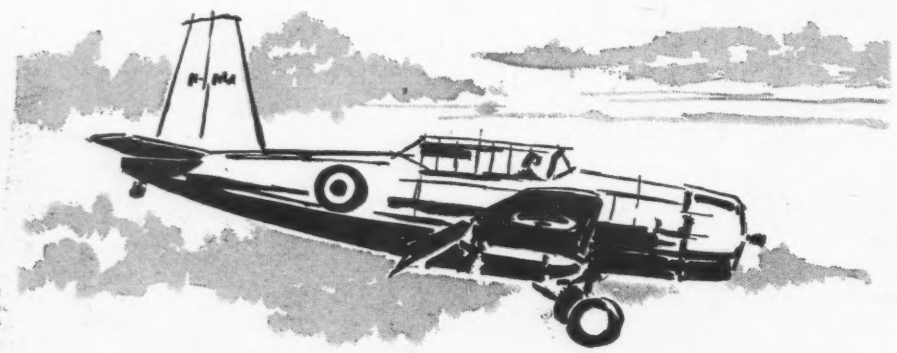
"Baker leader, this is Baker three. I've turned back and am falling in on Baker four." The voice of Junior Banham came out of my earphones. Seconds later, he moved quickly into a position off my right wing, his hand upraised reassuringly.

(Continued on following page)

"Roger, Baker three. Stay with him and keep me informed of developments." Squadron Leader Traill's voice, the same imperturbable voice he always used, even in the middle of a hot action, followed Junior's message.

"Have a look around, Junior, and make it quick! We may want to leave in a hurry." Then I switched to intercom. "How goes it, Johnny? Hanging on? Still with me?" Johnny Fenwick was my navigator-gunner.

"Everything's jake back here, skipper." The cockney accent always made me laugh. No one expected it from a guy like John. Scholarly and meticulous, he looked like a professor, until he opened his mouth. In spite of the situation, I laughed to myself and immediately felt better.



Junior's Vultee slipped below me and out of sight. By now, the smoke was thinning. I still fought the control column, and managed to gain altitude, even though my airspeed indicator told me I should be stalling out of the climb. I glanced below. The range of mountains that separate Burma and India live up to their rugged reputation. And they were swarming with Japanese.

Just ahead, the top of a mountain stood between my aircraft and the horizon. To the right, a mountain stream rolled on its way between the sloping walls of a 7,000-foot-deep valley. If we had to bail out, it would be over that valley.

Junior suddenly appeared off the tip of my left wing. Both he and Chuck Wesson, his nav-gunner, looked shaken and pale. He pulled in as close as possible, as though to reach across and give me actual assistance.

"You've got real trouble, Bill! Nasty-looking hole in the left wing, starting in close to the wheel well and running almost to the end of the aileron. You've also taken a hit in the lower part of the engine. One cowling completely gone." I could hear him gulp. "And one of your 500-pound bombs is a hang-up!"

* * *

"Gentlemen, the target this afternoon will again be Fort White." Our briefing officer, Flight Lieutenant Parker, looked at the twelve men gathered on wooden benches at the front of his desk. Behind him, on the briefing room blackboard, all of us could see the detailed outline of the now familiar Japanese-held clearing atop the mountains, just west of Kalemyo, Burma.

"All of you have flown against this target," Parker continued. Johnny Fenwick and I had been there eight times. "The object of this operation is to destroy the Japanese bunker emplacements. The Japanese are dug in deep, trying to hold the clearance for the road to Kalemyo. We're trying to get them out." He turned to pick up several aerial photographs from his desk. "These will give you some idea as to the results of our last raid. Fifty-two Squadron is getting about the same results." He handed the photos to Squadron Leader Traill, then cleared his throat. "As you can see from these, it takes a direct hit to put a bunker out of action."

Tony Traill looked the photos over closely before passing them on to the next pilot. Each of us in turn looked at them carefully, noting the large pockmark scars. We were getting the bombs close, but we could see that the bunkers were still there.

"Those bunkers are withstanding all the punishment we can throw at them." Parker stood at the blackboard, one shoulder resting against the wall. "In this area, we find their control position. Laterals run in five directions from this central point." His finger traced several lines on the board, smearing the chalk. "We want every one of you to drop your bombs exactly on this point!" Parker eyed each pilot. "And by that, gentlemen, I mean not five yards away, but right on this point!" His finger stabbed several times.

"You may have some cloud cover between here and the target," Parker continued. "The weather is very unsettled, and we can't be sure. If necessary, climb to 18,000 feet. No air opposition is expected, but we're sending an escort to rendezvous over the target area. You may expect the usual antiaircraft fire. There are no reports of changes in the ack-ack situation up to this morning."

The air war in Burma was a crazy, mixed-up affair. I was pushing forty missions and so far had seen no air opposition to speak of. There were no reliable weather sources of any sort. Twice the whole squadron had been caught in fog and bad weather, halfway home from the target. And I'm talking of weather that makes India and Burma about the two worst countries on earth to fly in. But at least we had the air to ourselves and were getting good results with our Vultees.

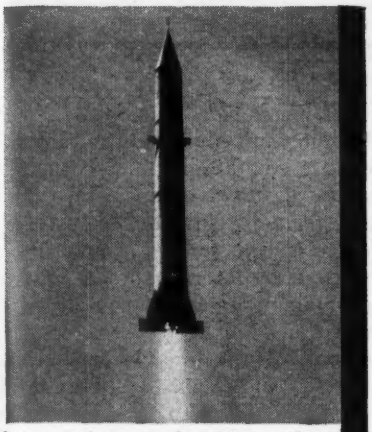
Ten minutes later, all twelve of us had drawn issue money belts, escape kits, and other gear.

A truck dropped us at the flight shack, and we ambled out to our aircraft, T for Tommy, the workhorse of the squadron—the only Vengeance on the flight that had a trouble-free record. I had a good ground crew, and they babied our aircraft. The rigger had taken time to paint on the personal trademark—in my case "Bugs Bunny," munching away on a carrot, with the words "What's up, Doc?" underneath. I glanced at the row of fifty-seven bombs painted on the side of the fuselage. Forty were mine.

I made the preflight inspection and was finally satisfied that all was in first-class working order. John shoved his gear into the rear office and came around the wingtip to help me check on the two 500-pound bombs, one under each wing. Two more were secured inside the bomb bay.

We pulled ourselves onto the wing of the Vengeance and settled in our seats. I strapped myself in and ran through the pre-starting check. Seconds later, the CO started his engine, and one by one the other four pilots followed suit. I was last to press the starter, moving the throttle ahead slowly as the engine caught and great clouds of white smoke billowed back from under the cowling. As the power plant settled to a smooth roar, the CO taxied in front of me. I released the brakes, pulled the bomb-bay doors closed, then taxied forward into line.

(Continued on page 70)



FICo engineers and produces the guidance for the Redstone Missile.
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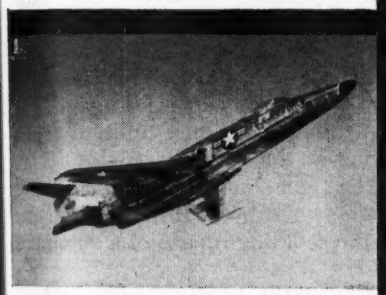

FICo navigational equipment goes into a wide range of aircraft.
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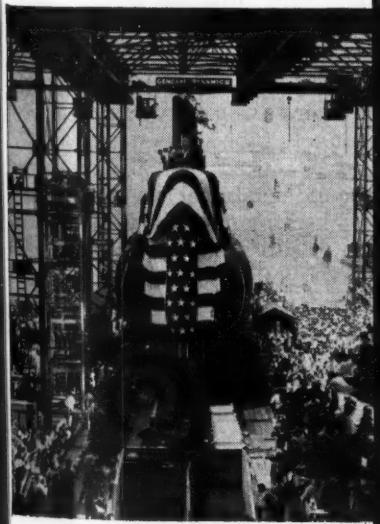

FICo controls are used in the atomic submarine program. FICo is also working toward development of the closed-cycle gas-cooled reactor.
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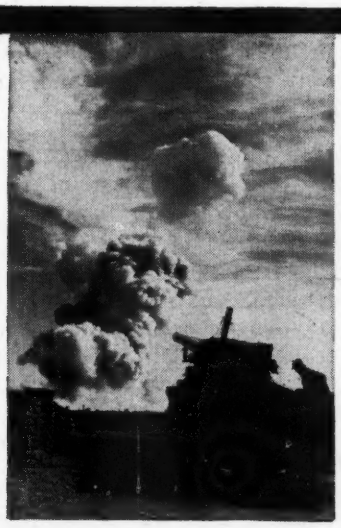

FICo research and design led to improved safety and arming device for Army atomic cannon.
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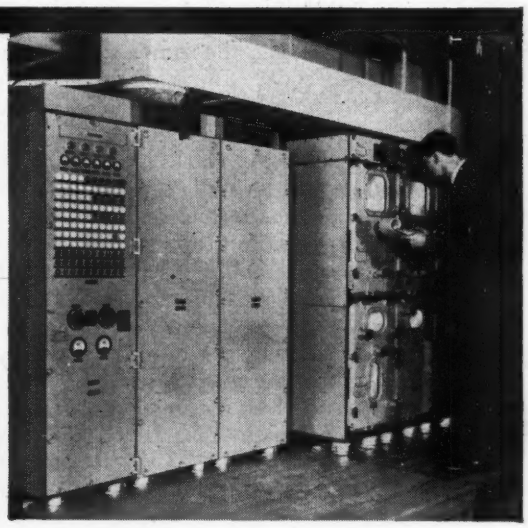

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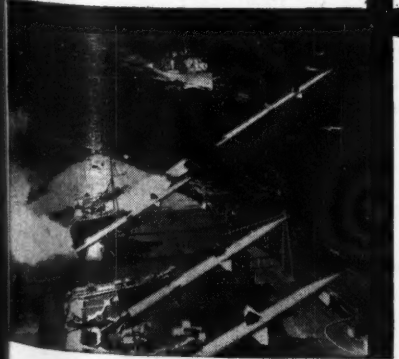

FICo launching and control order computers are used for Navy A-A missiles.—*U.S. Navy Photo*

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The previous day, as three of us landed after a scramble during a Japanese bombing raid, we had rolled along this same taxi path, when a huge elephant wounded during the raid suddenly crashed from the jungle and charged the three planes. The nav-gunners had been on their toes, and three pairs of .50-caliber machine guns slapped out at him. Even against that firepower, he managed to make it a close squeak.

At the runway, we lined up and swung into the wind for the warm up. I ran through the preflight check, snapped the park brake on, and revved up the engine. At full throttle, the Vultee really strained against the brake. I was getting maximum power. I dumped thirty degrees of flap, made another quick check of everything, then noticed that the CO was rolling forward onto the strip for takeoff.

Six thousand feet of concrete strip lay ahead of me as I rolled after him. The control tower, about three-quarters of the way down, was our takeoff marker. By the time you went sailing past that point, you horsed back on the stick. If the aircraft came unstuck, you had it made. If the tail wheel started rumbling along the runway, you had trouble. Today, all six of us were off at that point. The CO had started his gentle turn to the left, so we could join quickly—five chicks were with the mother hen.

The CO motioned for us to close formation and start the climb to 18,000. We leveled out again, relaxing into a loose formation. Here we had another enemy to fight. We were flying without oxygen. But if we had to drop below this altitude, we stood a good chance of having to abort the mission, so we struggled on in the rare air of our high altitude.

The sky was beautiful! As clear as only the upper reaches over the mountains can be. There was hardly a bump in the air, and the cloud cover below was almost ten-tenths.

"Close it up, Baker flight! Target in two minutes!" Traill's voice broke the serene atmosphere. I was surprised we had reached the target so soon. "Line astern and we'll circle until I can get a good look at the target." I made a supreme effort to close on the aircraft ahead and managed to fall in where I belonged. Then, through a break in the clouds below, I could make out the unmistakable shape of the bunker emplacements.

One by one, the Vultees rolled to the left and dropped away toward the white shape spread against the jungle and mountain green below us. As my turn came, I throttled back and hit the handle that returned the supercharger to normal. Then the aircraft was on its back. Bomb doors open as the nose started to drop below the horizon. Dive brakes out in position. I was vertical to the target below, aileron turning to get in the groove. I could see Traill starting his pull-out, far below, two other aircraft, the nearest about 1,000 feet ahead, between his aircraft and mine. Then I concentrated on putting my bombs where they would do the most good.

Tony Traill put his bombs in the dead center of the target. The rest of us could work on the dust and smoke cloud that rolled skyward. Work we did! One, then another explosion on the ground in front of me, and then it was my turn. Still aileron turning, I had a good approach going. I pulled the nose through the target and triggered the bomb toggle switch. With luck, it would be an excellent run. I was almost through the pull-out. Suddenly, I realized I was pulling out too low! That was when the Vultee staggered. I managed to level the old gal out and headed for the nearest valley, praying the aircraft would stay in the air. I could see one of the Vultees of my squadron ahead and far above me.

* * *

"O.K., Junior! As soon as I can get a little altitude out of this coffee grinder, we'll go over the side. Better ride along until we get clear!" At least we were still flying. A full fifteen minutes from the target area. And neither of us had caught anything from the ground. My altimeter read 11,000 feet, which meant that I had gained almost 2,000 feet since my pull-out over Fort White. I must have dropped to within a few hundred feet of the ground on my pull-out. Fort White sat near the top of a mountain that was 9,000 feet high. If I could keep the Vultee heading for the wide open spaces above, I might stand a chance of clearing the mountains and getting within walking distance of the airfield.

Hold together she did. And for another thirty minutes. By then, we were well clear of the mountains and I could make out the clearing ahead that I knew housed the airfield. The engine still sounded awful, and all the temperature gauges were registering off-the-clock readings. There were only occasional puffs of smoke from the engine, although the color of the smoke had now changed from white to black. When I was sure that we could be seen from the field, I throttled back and started letting down.

"Baker tower, this is Baker four! Approaching your field from the south. We are going to bail out. Banham will follow us down and circle until you can get a fix on him," I warned the tower at the field. "Am setting the trim on the aircraft so that it will fly into the mountains north of the airfield."

"Baker four, this is Baker tower. Roger. Will get a fix on Baker three as he circles. Luck to you. Baker tower out." It sounded so final!

"O.K., Johnny. This is it." My throat had suddenly gone dry, and I had difficulty speaking clearly. "Over the side, and take your time. Good luck. See you on the deck!" I reached for the handle to my canopy and yanked. Then I yanked again! And again! The damn thing was stuck tight. I began beating at the plexiglas enclosure.

"You got more troubles, Bill?" Johnny's voice broke through my panic like the soothing breeze of a summer's day.

"This outfit is stuck tight, John!" For seconds, I sat and looked at the handle. A chunk of metal worth maybe a dollar fifty, attached to a piece of copper wire worth a quarter, attached to an aircraft worth tens of thousands of dollars, and what happens! The damn thing won't work when you want it to!

Then I started thinking about the 500-pound bomb that still clung to my wing. I had thumbed the bomb release maybe twenty times during my pull-out, and another hundred times since then, trying to shake the bomb free.

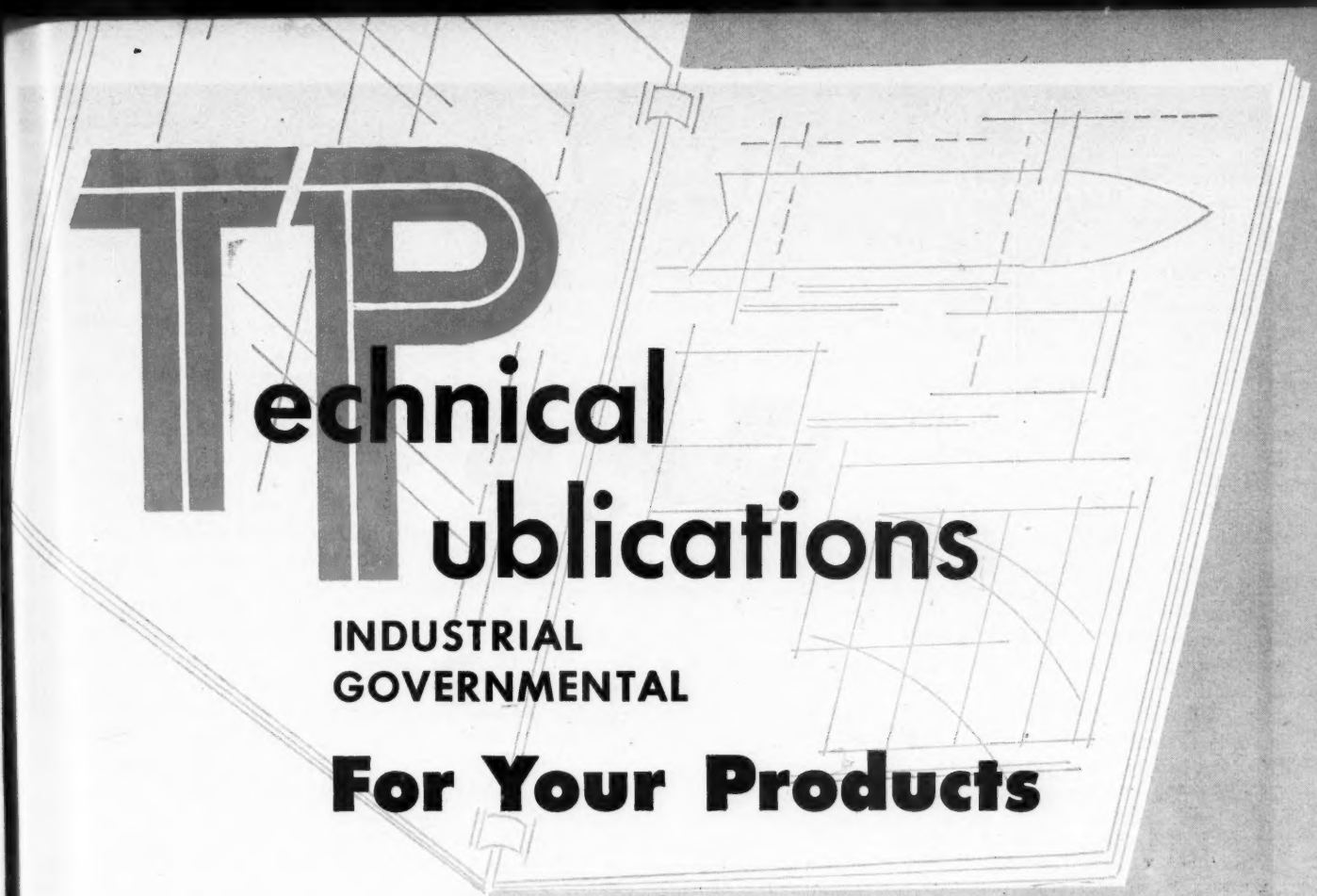
"Get out of here, John." I remembered Thompson, from Fifty-two Squadron. His landing had been a good one, but the 500-pounder that dropped off the bomb rack had blown him and his nav-gunner to hell right before our eyes. I doubt that he even know the bomb was there.

"I'd be a damn fool if I said no, Bill." The guy was scared stiff. We had been together a long time, as buddies in a war measure time. "I'll ride down lower with you. O.K.?"

"Christ, John! Get over the side of this damn crate now!" I could feel the sweat running freely down my forehead. Things were beginning to blur before my eyes. This was going to be the toughest thing I had ever tackled. Once Johnny had left the rear cockpit, I might be able to think. "Get out!" I screamed.

He started to cry. He was still crying when he jerked out his intercom plug and went over the side. I glanced back, banking slightly, to see him fall

(Continued on page 73)



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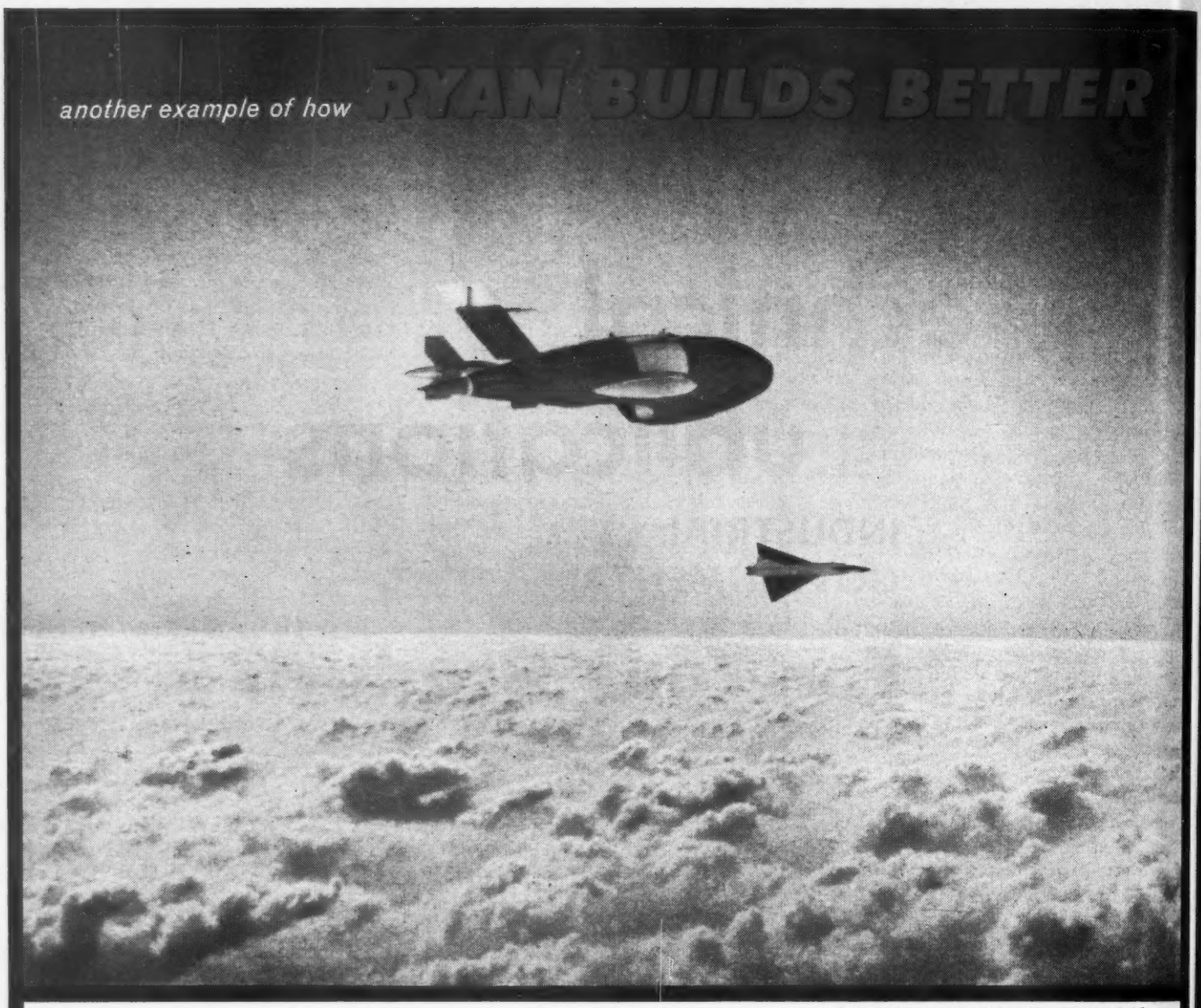

HIGH ALTITUDE PHOTO ABOVE EGLIN AIR FORCE BASE

FIREBEE: "ENEMY" JET OVER AMERICA

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clear and, seconds later, his chute blossomed. Right away, I felt better.

"Baker tower, this is Baker four. Now I've got canopy troubles and can't get out." I gulped for air. "I've got to try and land this thing. In case you don't know, I've got a hang-up under one wing. Clear that damn strip!" From what seemed to be a great distance, I heard the tower operator acknowledge my message. Then I was looking for Junior Banham.

"Bill! Can't you get out of her?" His voice revealed his conviction that he was about to watch a man die.

"No dice, Junior." I knew I sounded panicky. "Canopy is stuck tight. Slide in as close as possible and have a look at that bomb again. Is it fully fastened to the rack?" His Vultee appeared off to my right, moving in under me at a slow, steady pace. "Stay to one side and I'll rock hell out of her!"

Seconds later, "She looks solid enough. You're in one hell of a spot. The arming vane is gone, so she's fully armed. Work on that canopy. You might be able to get it free!"

I beat against the latch of the canopy with everything I could get my hands on. I even took my .38 from its holster, risking the ricochet of a bullet in the narrow confines of the cockpit, and fired all six rounds into the lock. The lock burst into a hundred pieces, but the canopy was still stuck. I had to land the aircraft.

"No luck, Junior. Get on the ground as soon as possible. I've got to get her down somehow." My shirt was soaked with sweat. My right arm, holding the still buffeting control column, started to shake. "Thanks for everything." My voice was a croak.

I watched Junior peel off to the left and angle down for the landing strip. He was talking with the tower, explaining the situation. His voice was all choked up and he sounded very, very excited.

By now, I was down to 5,000 feet. I throttled back slightly, then decided to glide the rest of the way, trying out stall characteristics in case the hole in the left wing affected the aircraft's lift. I was scared silly, almost sobbing to myself, but managed to pull the airspeed back close to the hundred-mile-an-hour mark. The Vengeance stood up well.

Below, I could see activity on the field, as they cleared aircraft away from the strip. I wondered if I could walk away from this landing. I thought of the boys in the mess, the boys of the other squadrons, wondered if I would ever join them again as they ate dinner, played darts, sat around the flight shack shooting the breeze, or lined up for pay parade. By then, I was down to 2,000 feet.

I thought about my final approach. I had to think of something, or I would end up by throwing in the towel and nosing the aircraft straight down into the jungle. I remembered every landing I had ever made in a Vultee. My approach would be at 120 miles an hour. At the proper time, I would pull level with the runway. The aircraft would settle, and I would try to hold off as much as possible. At the exact instant that she stalled toward the ground, I would horse back on the stick with everything that I had left in my body. It was the only way.

At 1,000 feet, I turned onto the downwind leg of my circuit. There was no movement whatsoever on the ground. As I traveled downwind, I could make out people standing well clear of the strip, next to the slit-trenches that were used as air-raid shelters. At 700 feet, I started a gentle turn to the left and held it until I was lined up on the strip. At the far end of the runway, I could see Junior's Vultee, pulled well clear of the strip. Then I had to watch nothing, think nothing, dream nothing but getting the old gal onto the ground.

Then the ground was coming up fast! Suddenly, I realized that if that bomb went boom, I wouldn't know it. I also realized that I was going to fight this thing through with the last ounce of strength in my body. After that, it was a lot easier to watch that ribbon of hard concrete looming larger just over the nose of the aircraft. After that, I was really fighting again!

The end of the runway flashed by under my wings and I pulled the Vengeance level with the ground. It was a perfect final approach. If that bomb dropped off it really would be final! I held the 7½ tons in the air as she fought to settle in a wheel landing. The ground was whipping by very fast. Still she fought to get her wheels on the ground and I fought to keep her clear. After what seemed years, I knew that I could no longer keep her in the air. I reefed back on the stick with all the strength I had! My shoulders were suddenly tense, my left hand gripped the already closed throttle, my legs were like two bars of steel!

I thought at first that I had missed the ground altogether. Then I realized that the Vultee had settled, was rolling forward nicely, and so far, I was home free. My left hand reached for the switch and I killed the engine. After that, I kept the aircraft rolling straight down the runway, until I had lost all forward motion and had come to a stop about three-quarters of the way down the strip. After that, I couldn't move.

I was aware that the crash truck and a jeep had pulled up near the aircraft, still at a safe distance, and that four men were now approaching me. In a daze, I watched as they gingerly walked under the wing. Seconds later, my rigger had climbed onto the left wing and was soon busy with tools, trying to get the canopy open. When he had succeeded, all I could do was sit there, gulping in lungs full of fresh air. I didn't move until the squadron doctor had climbed up next to the cockpit and handed me a glass. It was a tumbler of whisky. It tasted like water!

Minutes later, I was on the ground, fumbling in my pocket for a cigarette. No one spoke to me. I stood and watched the four boys lowering the bomb to the ground. Then I was sick all over the airfield.

After that, it wasn't too bad. They gave me a ride to the hospital, where Doc shot me full of junk and tucked me into bed. The CO came by before I dropped off. He was glad that I had done such a fine job. I remember thinking that he wasn't half as glad as I was.

Two days later, Johnny and I were back in the air again, on another mission. We finished our tour of duty in Vultee Vengeance aircraft, then converted to DH Mosquitos for a tour of duty on low-level bombing. We also had one hell of a blow-out in Calcutta.

Know what? When they latched onto T for Tommy, to tow the aircraft in for repairs, they had quite a time. Halfway to the maintenance flight, the left wheel folded up!—END

ABOUT THE AUTHOR

Regular readers will remember Warren Tolar's "Locks of Death" in our October '57 issue. After serving in the Royal Canadian Air Force in World War II, Mr. Tolar went into civil aviation and stacked up 5,100 hours in the air, in more than forty types of aircraft. Since 1949 he has been in construction engineering and recently has started doing freelance writing. He now lives in Port Credit, Ontario, Can.

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Where Is Our American 'Know-How'?

With the advent of the Soviet Sputniks and the apparent lead of the Soviets in procuring an operational ICBM, one does not hear the familiar "American Know-How" extolled as often as in the past, and this is probably a good thing. Perhaps now, faced with an impending crisis (which historically seems to have been a requirement for the United States to obtain or maintain military superiority), we will take a little time out from praising "Know-How" and devote it to the more creative occupations of "Learn-How" and "Use-How."

The importance of Learn-How is generally recognized; the individual is aware of the opportunities resulting from a thorough education, especially a technical one, and the government recognizes the fact that the Russians are constantly gaining on us in the number of technically trained people available; furthermore, something is being done about it. One almost begins to suspect, however, as one listens to the beep-beeps from outer space, and as one thinks of a vehicle (*not* a test vehicle) making the trip from Moscow to Detroit in fifteen minutes, that their "something" seems to be a little more successful than ours.

One may argue that they are sacrificing the dignity and freedom of the individual to achieve their ends, whereas we do not believe in such methods.

Well, what is wrong with our system? Let us consider the Air Force, to take as an example an organization which places great stress on technology. We will start with the tech school system, so necessary and so expensive. The author was one of about twenty students in a ten-week course in wire communications; the students were all college graduates with degrees in electrical engineering. The only real knowledge they gained in the course was the AN-nomenclature of a few pieces of equipment, how that equipment was hooked up, and a little about reading supply catalogs, all of which could have been gained on the job in a very short time by reading a few paragraphs in a regulation or tech order. The rest of the ten weeks was spent arguing with the instructors when they tried to tell the students certain "facts" which were in fundamental conflict with basic physical phenomena (an example for the more technically minded being an instructor's telling us that a battery was a rectifier), or in one of the students explaining something to the class *and* the instructor. The reason for this? The students generally knew more than the instructors; this was because the knowledge of the instructors consisted almost entirely of that gained in attending the same class a few weeks or months before. Is this good Learn-How?

When a person has gained knowledge about something, a question arises: "Use-How?" The author is being used as a supervisor of about fifteen airborne radio operators. What happened to wire communications? Well, everyone realizes that the exigencies of the service sometimes make the ideal assignment impossible. What about the engineering knowledge? There is absolutely no opportunity to use it.

The above facts take on added significance when one considers the following: the Air Force spends fantastic sums of money sending people to college through the USAFIT program, so they may be used in research and development when they have earned degrees. It is, however, reluctant to give assignments requiring a highly technical background to people who have a date of separation which is not too far off. Why not use the people who have earned college degrees at their own expense for the desperately needed technical positions? In the same ten weeks they spend in the tech school, they could become familiar enough with their jobs to be genuinely useful, and possibly, seeing that the Air Force did have something to offer to the engineering-minded person, they *would* make the Air Force a career, instead of waiting patiently to get back to civilian life in order to earn a return on their investment of $10,000 or more in an engineering education!

Another point in question is the RIF program. While some technically-minded people in nontechnical jobs resist all attempts to retain them and try every legal way of getting an early out, other people who *like* their nontechnical jobs are riffed.

What does this situation mean to the security of the entire nation? It means we are letting ourselves fall behind because we are not using what we have. It means there are engineers being released from the service after three or four years who have had no opportunities to contribute their knowledge to the defense effort or to develop their technical abilities, and therefore are not only disillusioned but a little rusty, and have three or four years less technical experience with which to benefit their country in a critical civilian job; meanwhile the taxpayer foots the bill for others to receive the same knowledge those engineers already had.

Let's stop marveling at those beep-beeps and complaining about letting Laika die in Sputnik II, and get something up there which will beep for two years instead of two weeks, or bring a Laika of good, prosperous American upbringing safely back to earth for a good two-inch steak, and then let's be proud not only of our American Know-How, but of all three: Learn-How, Know-How, and Use-How.

2D LT. STEPHEN G. W. BECK VON PECCOZ

The author graduated with honors from Cornell University in 1956 as an electrical engineer. That same year he was assigned to Scott AFB, Ill., having obtained a commission through the AFROTC program at Cornell. He is now Communications Officer for the 96th Air Refueling Squadron at Altus AFB, Okla.

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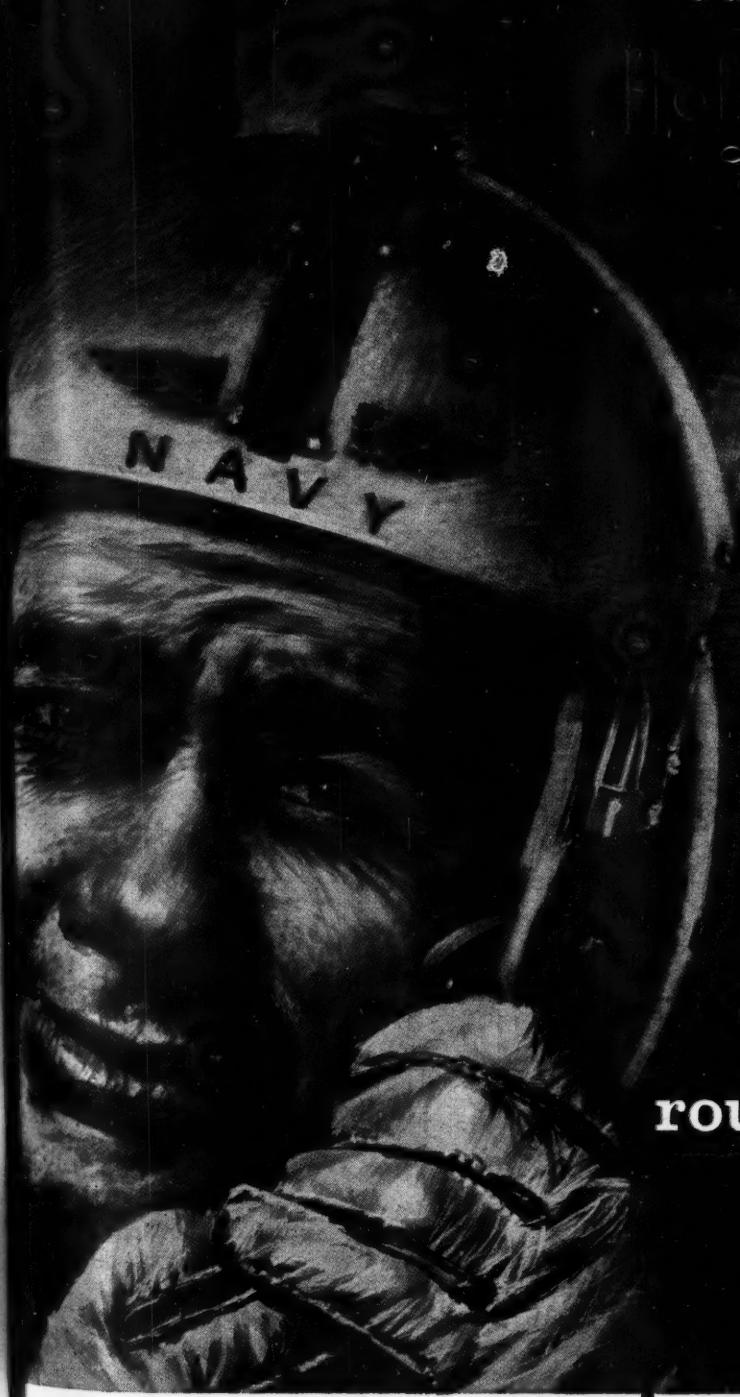

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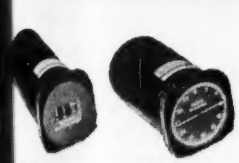

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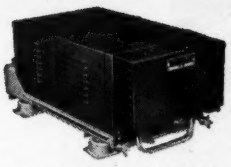
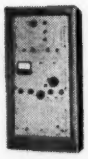


Airborne TACAN-VORTAC Receiver/Transmitter



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USAF communications men receiving vital messages on air-to-ground radio channels and preparing them for relay.

By Flint O. DuPre

AS HE streaked southward and back on his record-breaking KC-135 flight to Buenos Aires last November (*see* AIR FORCE, *January '58*), USAF Vice Chief of Staff Gen. Curtis E. LeMay could, at the flip of a switch, communicate nearly instantaneously with USAF Headquarters. His Boeing Stratotanker was, indeed, a flying command post—ready for any emergency—thanks, in great part, to the men who man the worldwide miracle of Air Force communications.

Like everyone in the Air Force, General LeMay depends for his "communications capability" on AF personnel around the world who operate every known communications device from telephones to the intricate electronic complexes used in warning systems and missile launchings.

Yet it's a paradox that communications, with its life-and-death importance, is the career field in which the Air Force has most trouble retaining qualified personnel.

Underscoring the problems, not long ago, USAF Chief of Staff Gen. Thomas D. White reported that more than seventy-five percent of the airmen in this highly technical field were leaving the Air Force presumably for higher paying jobs after their first enlistment. General White said we needed these high-caliber men to face technical problems beyond anything previously known to the military, and added: "There is no hope of achieving technical supremacy and managerial efficiency if our manpower turnover continues at its present high rate."

For years the Air Force has been trying to do something about this problem. It knows that communications seems pretty dull when compared with supersonic flying or missile manning. Yet the communications field must be staffed.

The Air Force knows it is losing its communications men to private industry—after training them at heavy expense—and wants to stem the tide. Adoption of the Cordiner Committee recommendations for incentive pay holds one major hope. Another is an elaborate reassessment of career fields by personnel officials to meet missile-age requirements. Communications figures most important in the cross-training and new training now under way.

WAF marks teletype tape with grease pencil in tape multiplication section.

Those new in this career field will be vital to the Air Force's stepped-up missile program, with operational units now being formed to handle the big and little "birds."

Two of the key words in successful missile launchings—like those now being carried on at Cape Canaveral in Florida—are control and safety. Integrated control of missiles requires that operational command levels be given such essential information as missile status and targeting orders. This information is required by successive levels of command. Conversely the launch complex, the lowest entity, must be freed from all unnecessary staff interference and rapid communications provide the clue to adequate control of missiles before launching.

Missiles are so inherently dangerous that safety measures must be enforced at all times, and self-reliant men who exercise judgment in their operation must be kept informed at all times within the missile organization.

Communications officers or airmen will become increasingly important as the guided missile units grow. A good illustration is missile refueling. The volatile nature of fuels and the importance of rapid fueling make it necessary for the launch commander to know at any time the exact status of

(Continued on page 79)

Vought Vocabulary

e·con′o·my: *when round-trip missiles save taxpayers $102,950,000*

Most missiles land head-first – and, like a bomb, just once. This destruction is desired in a missile strike, but it makes development costly. Scores of missiles often are expended before development problems are solved.

Vought's *Regulus I* and *II* reduce this expense by their dual application. Tactical versions of these guided missiles can strike head-on, with a devastating nuclear wallop. Test and training versions, used in development, can be recovered to fly again.

One *Regulus* was flown and recovered *18 times*... another made 16 successful flights. Six hundred recoveries of both missiles have saved $102,950,000 and gained an inestimable quantity of technical data.

Regulus I has armed submarines, cruisers and carriers with a nuclear punch since 1955. *Regulus II*, with a range of more than 1,000 miles and able to exceed twice the speed of sound, will join the Navy's underwater and surface Nuclear Fleet.

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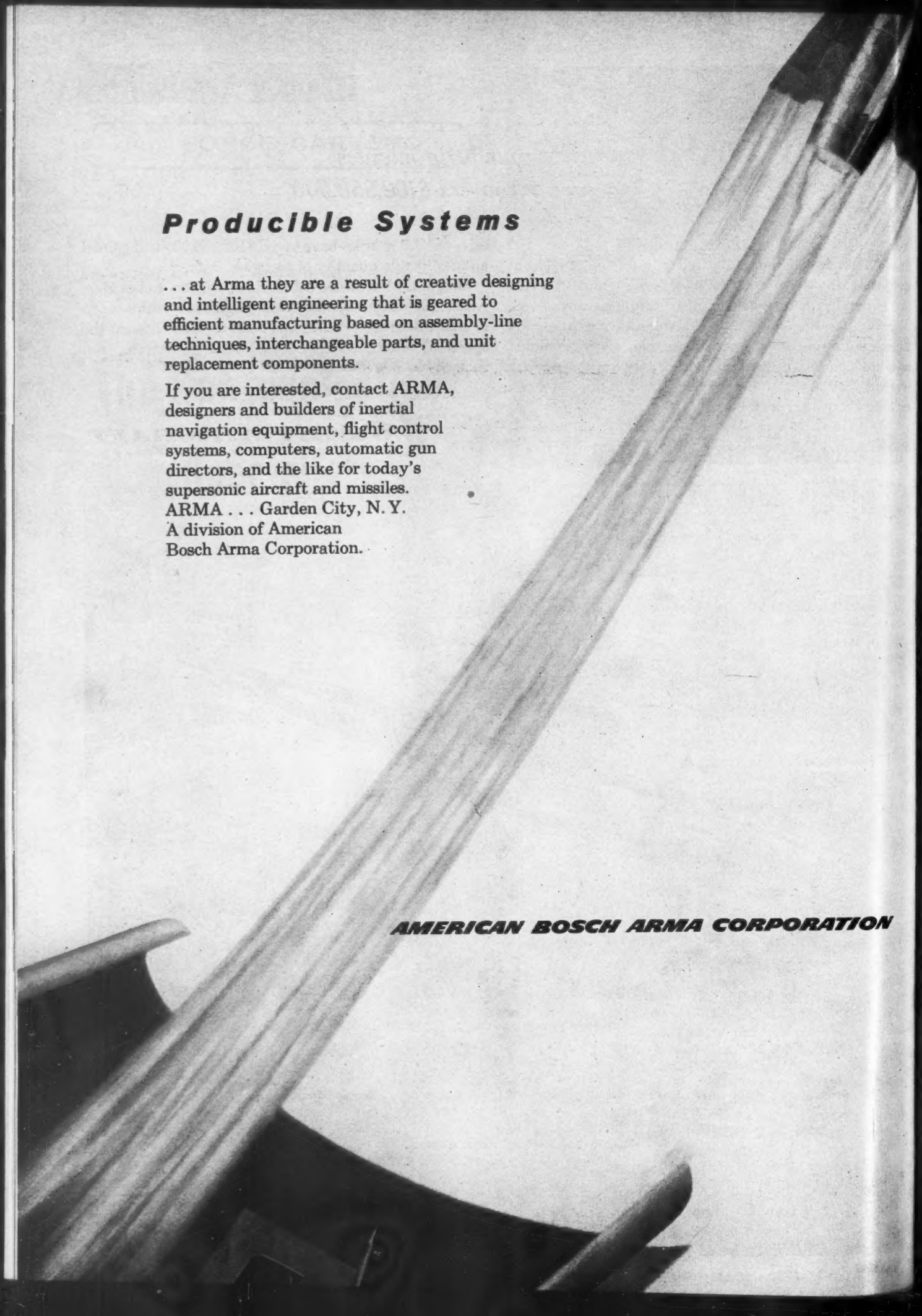

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this function. Only rapid communications answers such demands.

It is with some pride that careerists in the communications field like to point out that their tools are much older than the airplane itself. They will tell you that Billy Mitchell, early champion of airpower, supervised the stringing of telegraph wires in Alaska just after the turn of the century, years before he found in the airplane his real mission in life.

This early attention to communications in the frozen wastelands foreshadowed the elaborate electronics system of today as Air Force men watch from their isolated outposts for any possible surprise attack over the top of the world.

The communications career field has grown up with the Air Force. Today there are thousands of military and civilian persons working in communications, and many hundreds in Air Reserve and Air National Guard units backing them up. They include superintendents, supervisors, specialists, operators, technicians, and helpers. They work in cryptography, radio, and electronic countermeasures. They staff the equipment used in flight checking, and furnish radio and radar aids to navigations systems and for instrument landings. They provide communications necessary for balloon launching; Maj. David Simons can thank them for aid in his recent nineteen-mile-high, record-breaking balloon flight to the edge of space.

They operate and maintain a worldwide communications system enabling Air Force organizations scattered all over the globe to communicate with each other in a matter of seconds. They provide the key to instant early warning of an impending attack, being all-important tenants at the North American Air Defense Command in Colorado Springs, nerve center of our warning system. They help keep information flowing in the labyrinth of the Pentagon.

USAF men staff the Strategic Communications System, a worldwide, long-range, point-to-point, and air-ground air-communications net that provides our nation with centralized control of bombers dispersed on air bases in many locations. Any major air commander can communicate with any of his unit commanders anywhere they are located, and promptly.

Most of the airmen in this career field hold Air Force Specialty Codes in the 29 series. Officers are in the 30 series, the Communications-Electronics field. Airmen also hold AFSCs covering Air Traffic Control & Warning, Radio-Radar Maintenance, and Wire Maintenance. They fill communications functions in the fields of Intelligence and Psychological Warfare, Armament, and Combat and Operations. Ground electronic devices and systems for the control and tracking of aircraft and guided missiles are among their responsibilities. Some careerists operate airborne radar equipment used as aids to fighter intercept, bombing, navigation, and guided missile control. Others maintain electronic equipment and armament and missile guidance systems.

What are the experience and education requirements for communications work? Generally, anyone with average intelligence and some skill in electronics can qualify for important assignments in the field. Many do and, unfortunately for the Air Force, take their skills with them to industry.

The education level for officers is completion of college courses in theory of electricity and electronics. B.A. degrees in electrical engineering are helpful, too.

Training for both airmen and officers is practically continuous, with Air Training Command, Air University, and other groups concentrating heavily in special instructions. There is an advance communications-electronic officer course available, and courses are being added to meet requirements of the missile age.

Contributions of communications specialists in war years, and the peaceful periods in between, are endless. What air battle has been won without accurate transmission of messages in secret codes? How many lives have been saved in peacetime because a message could be transmitted to rescue and search units rapidly? The answers are legion.

And the need for communications specialists grows each cold-war day. —END

Historical moment in USAF communications was marked in 1951 when Maj. Gen. F. I. Ankenbrandt inaugurated transcontinental two-way push-button message system.

Communications facilities vital to air distress and "bogey" warning system gets routine check by repairman.

ABOUT THE AUTHOR

Flint DuPre, a civilian employee of the USAF, in the Office of Information Services at headquarters in the Pentagon, has written this series on AF careers for us for more than a year now. Mr. DuPre has been connected with AF information programs, both in and out of service, since 1942. A veteran newsman, he was formerly the sports editor of the Dallas Journal. *This article concludes the series.*

The READY ROOM

RESERVE AND AIR GUARD NEWS

The congressional group most intimately concerned with the reserve programs of the Air Force is known officially as "**Subcommittee No. 1** of the Committee on Armed Services." Its chairman is **Rep. Overton Brooks,** Democrat of Louisiana, who is principally credited with the fact that recent appropriations bills have spelled out in specific terms the sums of money to be expended for reserve construction.

Last summer Congressman Brooks recommended that the three services undertake a "thorough study" of their reserve programs. "It seems to me," he said at that time, "that in view of the international situation, need for economy in defense spending, and the changing concepts of warfare, this study is necessary so that the Congress may be informed and, if necessary, enact implementing legislation."

Mr. Brooks now has notified Air Force—and the other services—that his subcommittee will convene this month to make a formal inquiry into the reserve programs, with **special attention to be directed toward size** of the components and the **roles and missions** they may be expected to assume in the future.

Principal witnesses for the Air Force in this inquiry will be **Hon. David S. Smith,** Assistant Secretary for Manpower, Personnel and Reserve Forces; **Maj. Gen. Richard A. Grussendorf,** Assistant Chief of Staff for Reserve Forces; and **Maj. Gen. Winston P. Wilson,** Deputy Chief, National Guard Bureau.

Air Force is prepared to tell the Brooks Subcommittee the history of the instability of its Reserve program—as contrasted to the comparative stability of the Air Guard program—and to recount its efforts in the last few years to make the Air Force Reserve program compatible with the D-day requirement.

In this connection, Reserve flying wings already have been converted to a **standardized airlift mission** by elimination of six programmed fighter-bomber wings and a decision to lop off three airlift wings because of a lack of support funds.

Reduction of the Reserve flying program to fifteen airlift wings means that only thirty-seven bases are now required—as against forty-three for a twenty-four-wing program—and the money needed to complete the flying construction program will amount to about **$50 million** instead of more than $70 million.

Air Force believes that a standardized airlift mission, reduction of number of bases and aircraft required to support flying units, and introduction of an **Air Reserve Technician** plan will combine to give the Reserve program a stability compatible with its wartime requirement through 1961.

But the Brooks Subcommittee hearings this month are expected to develop the fact that the Reserve program beyond 1961 can only be determined in relation to the missiles which then may shape the structure of the active establishment.

• • •

Amendments to the **Reserve Officer Personnel** Act have been prepared by the Air Force and should be submitted to Congress this month.

In all, **twenty-four amendments** have been prepared, three of which can be considered major changes. One of these would authorize temporary promotions in the Guard and Reserve; another would eliminate the so-called "pusher" clause from the current law; and the third would provide a means for the Air Force to retain any Reserve officer for a minimum of fourteen years.

Currently, ROPA does not authorize temporary promotions. Under changes proposed by the Air Force, an officer occupying a vacancy calling for a grade higher than that which he holds would be promoted. However, he would revert to permanent grade upon leaving the position for which he was promoted.

A **separate temporary promotion** feature is contemplated for the Air National Guard. This would involve granting authority to the states to nominate for promotion any ANG officer holding a position vacancy calling for a higher grade. Upon being federally recognized by the Air Force in the higher grade, the officer would be promoted. However, upon leaving the Guard and reverting to the Air Force Reserve, the officer would be returned to his permanent—or lower—grade.

The "pusher" clause has caused the most severe headache in promotions since the advent of ROPA. Under this clause, whenever an officer is considered for promotion, all officers of the same grade senior to him must be considered and—if qualified—promoted. In three years this clause has resulted in **more than 10,000 forced promotions.** In the case of promotions from major to lieutenant colonel, of the 7,800 made since ROPA, approximately 6,000 resulted from the "pusher" clause.

By eliminating this clause, promotions could be controlled in such fashion as to eliminate exceeding the number of spaces in all grades authorized by law, with a subsequent freeze on promotions which currently exists for most grades.

Suggested changes, Air Force believes, will bring promotion policies more in line with those existing in the Air Force. The proposed amendments will be submitted this month, prior to going to Congress, to a meeting of the Reserve Forces Policy Board of the Department of Defense.

• • •

Notes on the back of a Form 175. . . . Air National Guard has entered the missile era with reequipping of its **123d Fighter-Interceptor Squadron** at Portland, Ore., with Northrop F-89H aircraft. The F-89H Scorpion carries the **Hughes Falcon,** an air-to-air missile. Conversion of the squadron to the new equipment should be completed this month and other squadrons are expected to receive similar equipment in the future. . . . Four spaces are available this month and eight each month thereafter through June for ANG pilots in AF's **jet qualification course.** Spaces have been obtained for Guard pilots authorized to fly jets but who have not qualified. . . . Not so fortunate are airmen who have applied for USAF's **jet mechanic course.** Air Force has canceled Guard quotas, although the Guard Bureau is trying to work out an arrangement for resumption of this training. . . . **Air Weather Service** will issue a **forecaster certificate** to qualified ANG weather forecasters. Provisions of AFR 60-16 apply. . . . Fund reductions have caused the Guard Bureau to pare the number of technical representatives assigned to ANG squadrons. As a rule of thumb, squadrons which have had airframe and engine **tech reps** assigned for a year **can expect to lose this assistance.** . . . ANG units requiring **depot assistance** have been ordered to deal through Guard liaison officers on active duty at these depots. These officers are located at seven of the eight materiel areas in the country.

—EDMUND F. HOGAN

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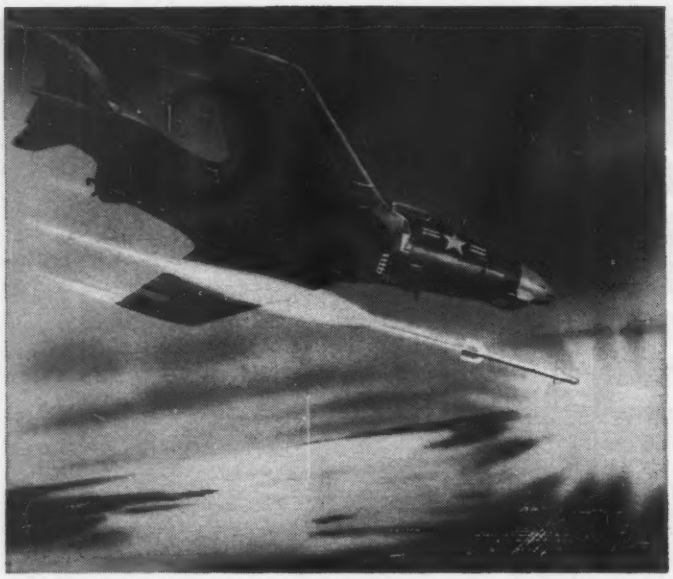
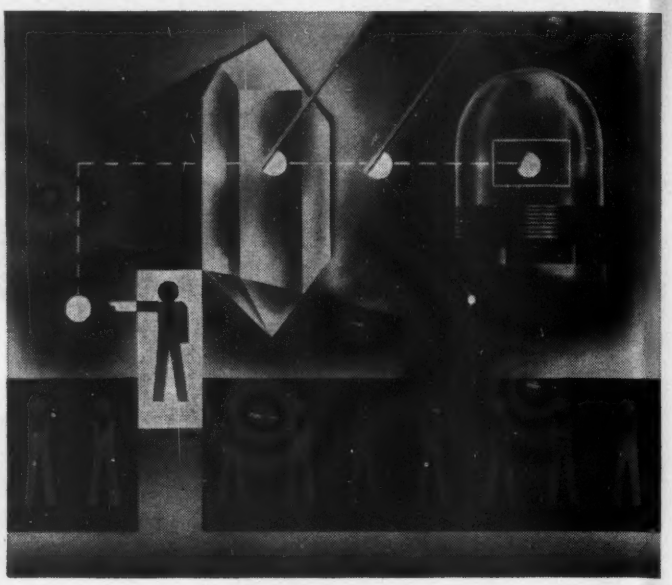


MISSILE COMPONENTS Bulova's infra-red seeker cell—the Sidewinder's eye—locks this missile on target; Bulova fuzing systems do the rest. Powder-driven gyros, timers, safety-and-arming systems and other electronic and electro-mechanical devices, designed and made by Bulova, play vital roles in the Dart, Talos, Sparrow... in all, 18 key missiles.



AUTOMATION Bulova R&D designed mechanized plant and equipment for Signal Corps goal of 10,000 perfect quartz crystals per 8 hour shift —with 1/10th the manpower. From systems analysis through equipment development, Bulova engineers devise industrial and military facilities for automatic production of electronic components and ordnance items.

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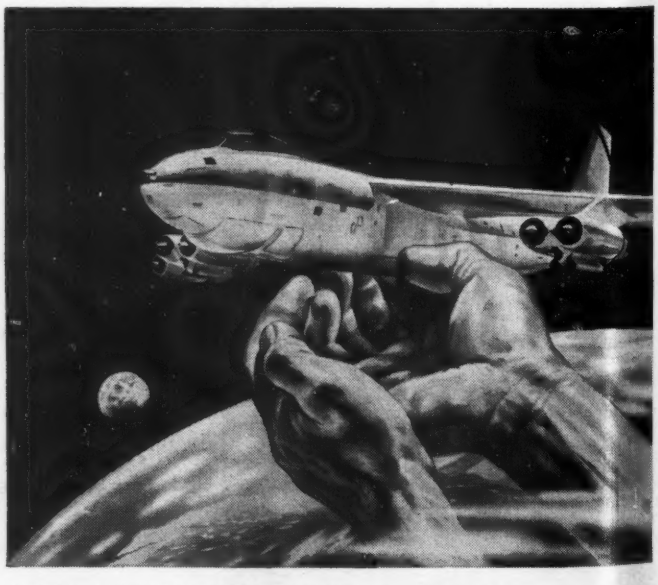
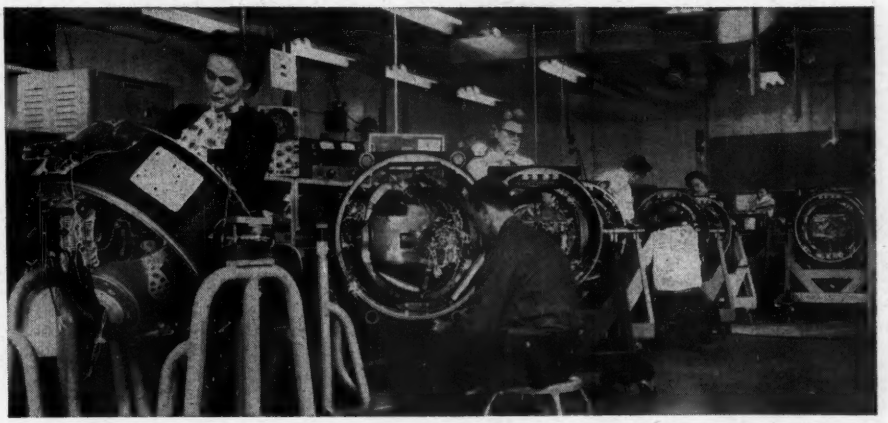


AIRCRAFT INSTRUMENTS Bulova's new Servo Altimeter combines unsurpassed sensitivity and accuracy with direct-reading tape presentation. Special pressure devices created by Bulova include transducers for air data computers... remote pressure sensors for weather stations and airports... climb and dive indicators... and autopilot altitude controls.

Tech Talk

General Motors' **AC Spark Plug Division,** Milwaukee, Wis., has announced it is going into **"volume production"** of **all-inertial guidance systems** for the **Thor ballistic missile** under Air Force contract. The guidance system depends on high-precision gyroscopes for accuracy. It is completely **self-contained** and immune to **"jamming."** AC Spark Plug systems have guided recent successful test flights of the 1,500-mile missile from Cape Canaveral, Fla. See cut for **first picture** of the components.



First released pictures of the General Motors AC Spark Plug assembly line at Milwaukee, Wis., where USAF Thor inertial guidance systems are being produced.

Convair turned **chase-plane** pilots into **photographers** recently to get test-flight **film footage of the Convair B-58 Hustler** by using a unique **adaptation of the gun camera.** Airplanes which carry both a pilot and a photographer just do **not fly fast enough** to keep up with the supersonic bomber. The answer was to let the chase pilot take the pictures, but this wasn't easy as he already had **his hands full** hurtling along in the wake of the B-58.

A **special pilot's helmet** with a **built-in camera** which operates by remote control proved to be the solution (*see cut*). Convair's cameramen stripped a regular gun camera, discarding all unnecessary parts, and mounted it on the side of the helmet where the pilot has unobstructed vision and can **"shoot" anything he** observes, maneuvering the chase plane for the exact picture needed. The camera is operated by pressing a button on the airplane control stick, and the pilot can reload the modified camera by **exchanging film magazines.** The assembly weighs **less than four pounds.**

Convair test pilot George Davis dons flight helmet with modified camera attached. Davis was first to use the camera as he flew chase for the B-58.

These Boeing-developed sound suppressors will help insure quiet for passengers on the Boeing 707 prototype jet transport planned for use soon.

At **Marietta, Ga., Lockheed** has successfully developed a **push-button system** that injects a **35,000-pound cargo** into its **propjet C-130 Hercules** air freighter in **forty seconds.** The system also works in reverse and can pull freight from a C-130 just as rapidly. The system shows a **forty percent saving in manpower** required to prepare and load freight for air shipment. An even more spectacular **ninety percent reduction** is effected of **idle ground time** now required of transport airplanes while cargo loading and unloading is in progress. A four-engine transport like the Hercules can be mechanically loaded and unloaded in **about fifteen minutes** as

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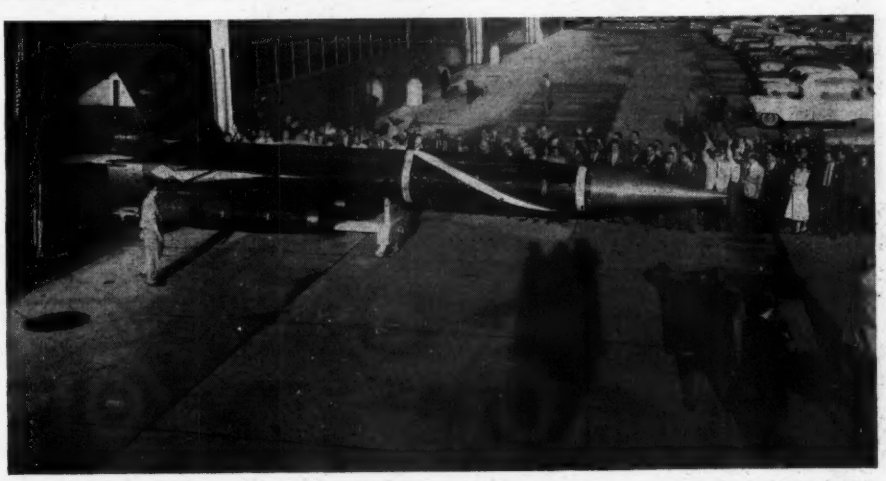
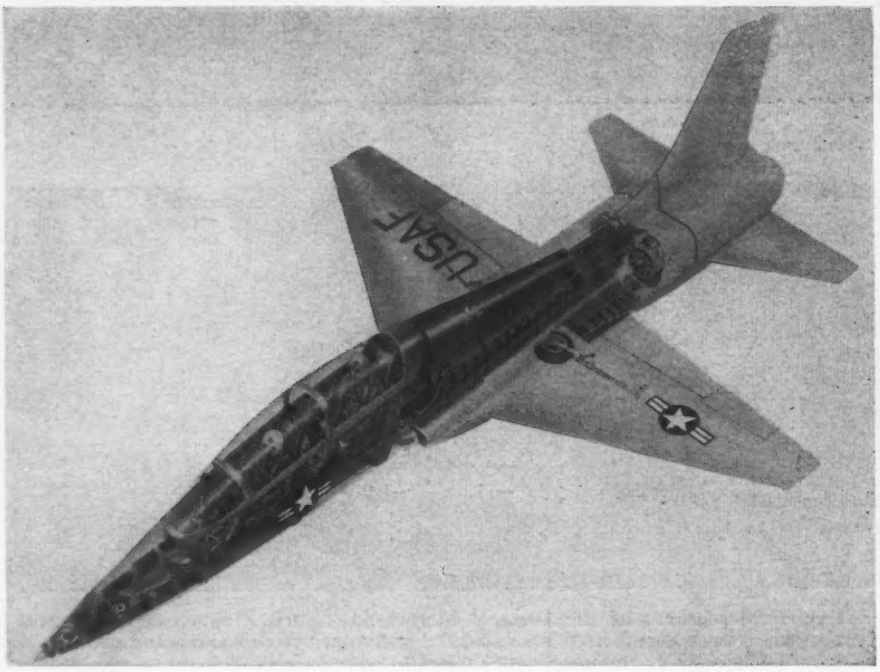
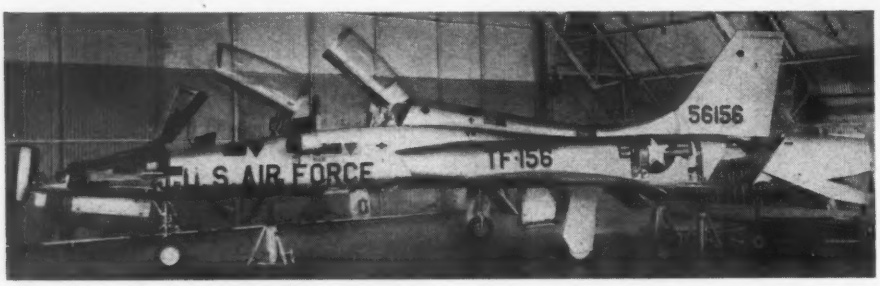


First production model Bomarc IM-99 area-defense missile to be completed by Boeing shown as it rolled off the assembly line in Seattle, December 30. The rollout and delivery to the Air Force marked the beginning of a program designed to supply Bomarcs and associated weapon systems to bases across the country. Bomarc is just one of the Space Age weapons that will be described in the March issue of AIR FORCE Magazine in conjunction with AFA's Third Annual Jet Age Conference.



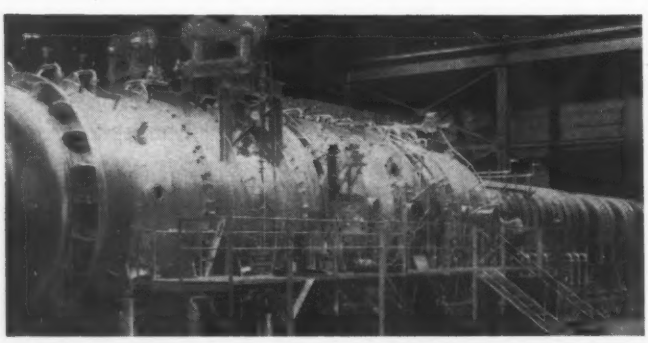


Cutaway (above) and sideview (below) of Northrop's new T-38 supersonic trainer, designed to fill the Air Force need for an economical but high-performance basic trainer with performance characteristics of currently operating aircraft.

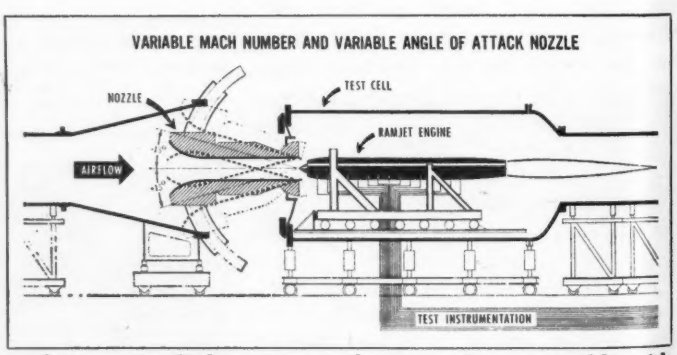
a **low wing with medium sweep** and an **all-movable horizontal tail** located below the wing chord plane to insure desirable stability and control characteristics. The twin high-thrust-to-weight-ratio afterburning **engines are located in the aft fuselage** (*see cutaway drawing*). Since all fuel is carried in the fuselage center section, the **wings contain only the main landing gear. The tandem-seating cockpit** arrangement, with the instructor sitting higher than the student, provides outstanding forward visibility for both pilots. Application of the **area rule** for fuselage shape is evident. The T-38 performance data is classified.

Ramjet engines for advanced and future aircraft and missiles soon will be subjected to **supersonic "test flights"**—at speeds up to **2,500 mph,** temperatures up to **650 degrees Fahrenheit,** and **altitudes above 90,000 feet**—without ever leaving the ground. Equipment to make this possible is to be installed soon in one of the engine test cells of **ARDC's Arnold Engineering Development Center** at Tullahoma, Tenn. The device, called a **"variable Mach number and angle-of-attack nozzle,"** is an improved version of a similar nozzle in use for testing smaller engines under less rigorous test conditions. The new nozzle was redesigned and built by **General Dynamics Electric Boat Division,** Groton, Conn.

Principal improvements in the higher-performance nozzle are its



Outside view of AEDC high-altitude engine test cell, to be equipped with "nozzle," developed by General Dynamics.



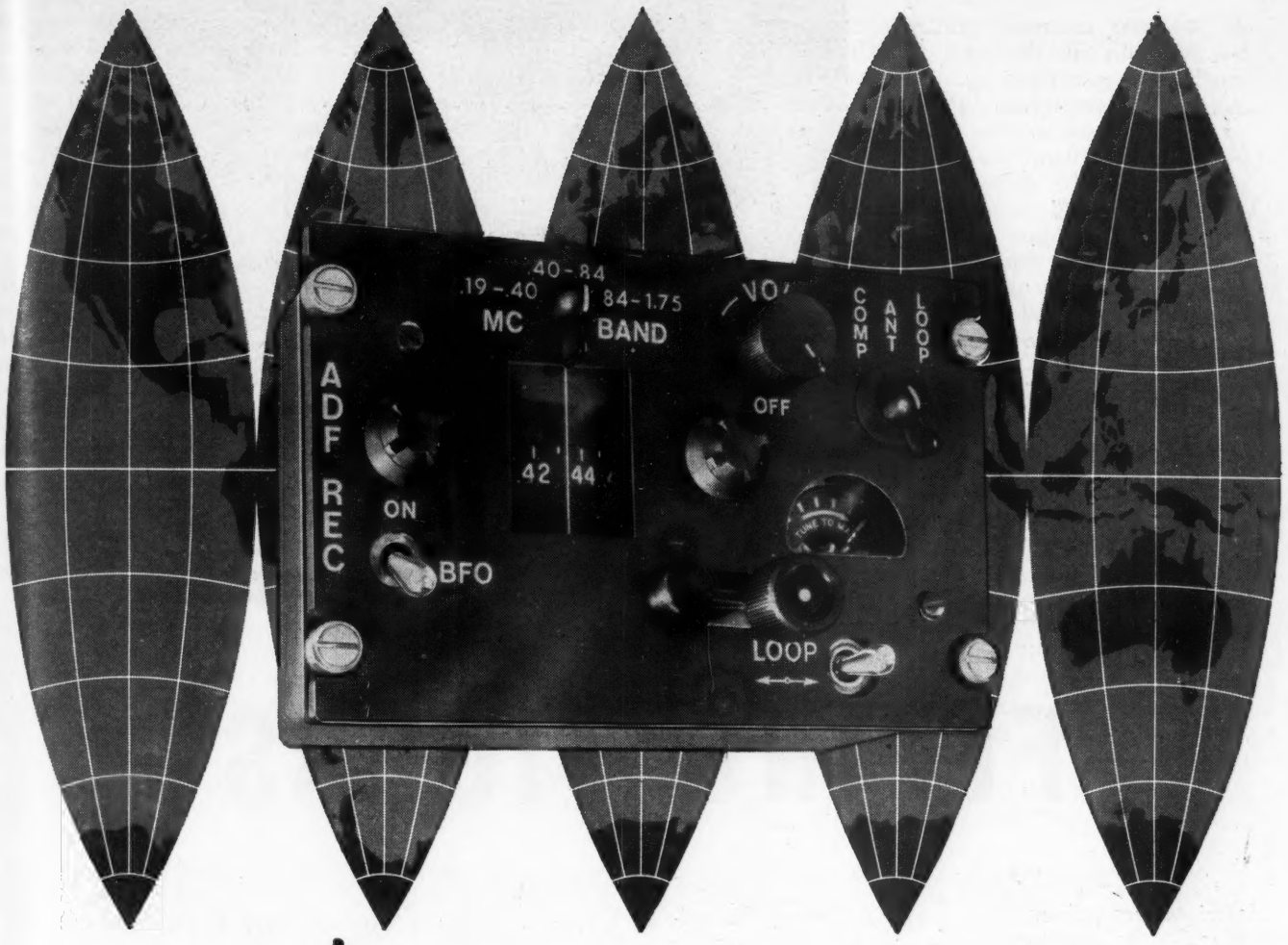
Supersonic flight tests on the ground are possible with AEDC's new "variable Mach and angle-of-attack nozzle."

compared to the usual minimum two to four hours.

The new system, identified with the C-130 propjet transport's **straight-in loading** through a nine-by-ten-foot opening, calls for the cargo to be tied to individual pallets in loads up to 7,000 pounds each. These pallets rest on **rollers in warehouses or at loading docks.** They can be speedily rolled onto a truck, which has rollers on the truck bed, and then pulled—by an electric winch—into the cargo bay of the air freighter, which also has rollers on the floor. Lockheed has been demonstrating the system to both military and commercial interests.

Northrop Aircraft has released additional details and photographs on its supersonic **T-38 trainer.** The general arrangement of the airplane shows capacity to handle higher temperatures and its improved ability to simulate climbing and diving test conditions by **varying the angle** (*see diagram*) at which the airflow enters the inlet of an engine. The nozzle was designed for minimum airflow of **760 miles per hour** (Mach 1) because ramjet engines are not capable of operating efficiently at lower speeds.

—Bob Strobell



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He led

them,

the ace-making . . .

. . . General Chennault . . .

FLYING TIGERS

Americans everywhere are saddened to hear of the serious illness of the great airman who led and whose name is synonymous with the great feats during World War II of the American Volunteer Group in China—the Flying Tigers. The following is one of the thirteen chapters of Five Down and Glory, *a history of US air aces by Capt. Gene Gurney, edited by Mark P. Friedlander, Jr., being published by G. P. Putnam's Sons, N. Y., on February 21, at $5.75, with this chapter reprinted here with special permission.*

From 'Five Down and Glory'

By Capt. Gene Gurney

EDITED BY Mark P. Friedlander, Jr.

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THE American Volunteer Group in China—the Flying Tigers—generated thirty-nine American aces during the short span of their combat history; yet the one man more instrumental in the destruction of enemy aircraft than any one of the individual aces did not himself shoot down a single plane. This man was Claire Chennault.

Claire Chennault left his job as principal of a small Texas high school to enlist in the Army Air Service in 1917. After the war he stayed in the service and served for twenty years in many exciting and useful capacities. He was a daring acrobatic stunt pilot and a recognized leader in the field of precision air-to-air and air-to-ground pursuit maneuvers. Even in the sluggish pace of the peacetime military his thoughts were constantly on the improvement and development of new fighter strategy. During his tour as an instructor with the Air Corps Tactical School at Maxwell Field, Ala., he wrote a textbook on the subject, *The Role of Defensive Pursuit,* which the school published in 1935. Also while at Maxwell he became the leader of an aerobatic act called "Three Men on a Flying Trapeze." In this act, with Lts. Haywood S. Hansell and John H. Williamson and later with Lt. William C. McDonald replacing Hansell, Chennault performed at Cleveland's National Air Races in 1934 and 1935.

But the many years of flying in open airplanes had gradually damaged his ears, causing partial deafness; so in 1937 Chennault was retired from active duty in the permanent rank of captain.

With thoughts of more leisurely occupations and of comfortably settling down, Chennault had taken his wife and eight children to Louisiana when he received the amazing offer of full command of the Chinese Air Force.

Six years had passed since the Japanese octopus had begun to stretch and spread its armed tentacles into the provinces of China. In 1931 the Japanese army had swept into Manchuria; in 1932 Shanghai had fallen; and now in 1937 the Imperial Army of Japan stood poised for their big invasion into the heart of the Chinese mainland.

As early as 1932 Col. John H. Jovett, a West Point graduate and famous balloon commander in World War I, had begun the work of organizing the Chinese Air Force along a US design, but development had been slow. In 1936 McDonald and Williamson, Chennault's old friends of the "Three Men on a Flying Trapeze," had gone to China at the invitation of Madame Chiang Kai-shek, the National Secretary of Aviation, to organize a flying school. But now the Japanese serpent was coiled to strike, and there was still no Chinese Air Force to meet the pending onslaught. Under the urgings of McDonald and Williamson, plus another old Air Corps friend, Roy Holbrook, Captain Chennault accepted the Chinese offer and went to the Orient with the Chinese rank of colonel.

He arrived at Kunming Field, located in a valley beneath the She-shan Mountains, in July 1937 slightly behind the Japanese attack on Peiping, to find that his air force was only a miserable handful of obsolete aircraft manned by a few Chinese and professional-international pilots. Nevertheless, their training had been good, and a well-conceived skeleton organization had been established. Colonel Chennault was not discouraged for he was determined to teach and employ his own advanced concepts of aerial warfare, and equally determined to build the Chinese organization along the lines of his own theories of pursuit tactics.

Madame Chiang Kai-shek purchased for Chennault's personal use a $50,000 Curtiss-Wright P-36 which he used extensively to observe from the air the training of his men and the development of their dogfight tactics.

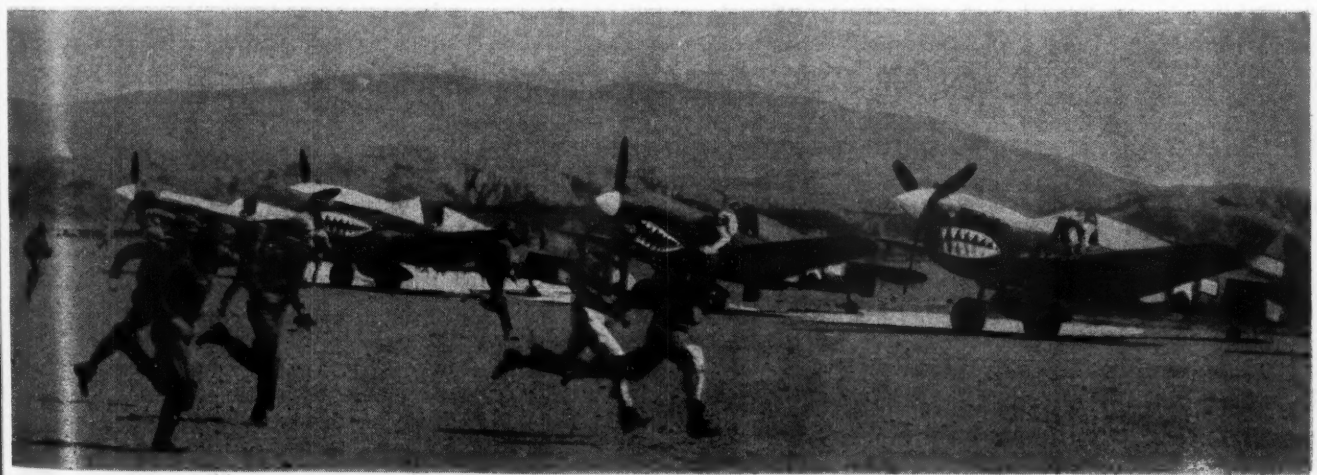
To protect his embryo air force from Japanese air raids he instituted a Chinese radio warning system. Radio lookout stations were established along the Japanese bombing route from the advance Japanese air base at Hanoi, Indochina, to his own Kunming Field. As the stations warned of oncoming enemy bombers, the Chinese planes were air-evacuated and dispersed throughout the countryside. This warning system was considered so effective that the United States War Department reported that "the Chinese headquarters was warned of a raid while the Japanese bombers were still warming up at their bases." It was among the earliest successful early-warning air-raid systems.

Among the American people there was a great deal of sympathy for the sufferings of the Chinese people as the victorious Japanese army overran and ravaged their country. Early in 1941 this sympathy had concrete expression in the granting of a hundred Curtiss-Wright P-40B Tomahawks to China. (Later models used by the United States were the P-40E Kittyhawk and the P-40F Warhawk.) However, the grant made no provision for parts or replacements, so whenever one of the crates containing a wing was dropped into the water during the loading process, it was carefully salvaged for what use could still be made of it. Later a hundred liquid-cooled Allison engines, which had been rejected by the Air Corps because of minor faults, were acquired by the Chinese. Dr. T. V. Soong, head of the Bank of China and brother of Madame Chiang Kai-shek, was in the United States making the arrangements and putting up the financial backing (although the payment eventually came from United States lend-lease funds).

After planes had been secured for China, Colonel Chennault set about acquiring American pilots to fly them. President Franklin D. Roosevelt officially approved the American Volunteer Group acquisition of military pilots. With the United States government's blessing, Chennault raided the military services for fighter pilots. He found forty of his old pursuit squadron friends and sixty naval and marine fighter pilots who were willing to fly for China against the Japanese. The youngest pilot was Henry Gilbert (twenty-one) and the oldest, Louis Hoffman (forty-three), who was later to become an ace. The Chinese government paid them well; in addition to a basic salary of $600 a month, a bonus of $2,500 was paid to each man as he became an ace. (Actually a rate of $500 was established for each enemy aircraft shot down.) Flight leaders were paid $675 and squadron commanders $750 a month. However, the money was an incidental factor to a majority of the adventurous men who believed in the Chinese cause.

The United States was still maintaining diplomatic relations with Japan, so special arrangements were made to give the pilots recruited by Chennault a release from their respective services. Hundreds of supporting personnel were obtained in the United States to help the fighter pilots perform their mission which technically was "to protect the air over the Burma Road lifeline to the Chinese Army." The first contingent of 150 support personnel included a flight surgeon's unit with two nurses. Chennault stubbornly insisted that his pilots be in top physical condition at all times, so when they weren't flying he usually saw to it that they had a boisterous baseball game

(Continued on page 89)



The briefing is over and pilots of the Curtiss P-40s at Chengking Air Base run for their planes and ready for the day's target. General Chennault's vigorous campaign among airmen friends gathered the crews for the Flying Tigers.

Christmas greetings from Chinese children were conveyed by these two youngsters who got hearty Chennault hoist.

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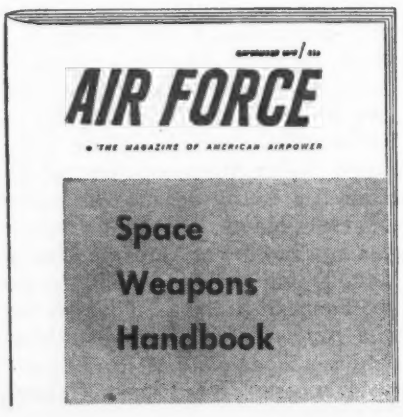

going in which Chennault ceremoniously reserved for himself the position of pitcher.

The Americans in this volunteer group had to sign one-year contracts "to manufacture, service, and operate aircraft in Asia" with the Central Aircraft Manufacturing Company of China, called CAMCO, and set up to handle the American Volunteer Group.

When the men sailed on July 11, 1941, from San Francisco on the crack Dutch liner *Jaeggersfontaine* the newspapers picked up the story in spite of the cloud of secrecy under which she sailed. They predicted that Japan would never allow her to reach China—the *Jaeggersfontaine* sailed westward while the world waited and watched. West of Honolulu, in dangerous waters, two cruisers suddenly appeared alongside the *Jaeggersfontaine*—American escorts. The ex-carrier boys among the AVGs identified the cruisers as the *Salt Lake City* and the *Northampton:* President Roosevelt had not forgotten the young Americans.

Both men and planes poured into Rangoon, Burma, during the summer of 1941. Chennault formed his material into three squadrons: the 1st, or "Adam and Eve" Squadron; the 2d Squadron, called the "Panda Bears"; and the 3d Squadron, "Hell's Angels." The Adam and Eve and Hell's Angels Squadrons had their planes decaled with colorful females. Inspired by a magazine picture of a fiercely painted British fighter, Chennault had the ground crews paint a row of shark's teeth along the air-intake recess of the noses of all the P-40s. The men added blood-red tongues and fierce eyes to complete the picture of the tiger shark. This was especially symbolic to the Chinese whose national emblem was the tiger—an emblem growing out of the overthrow of the Manchu dynasty and the formation of the Republic in 1911. The nickname, Flying Tigers, quickly sprang up in reference to the Americans in the painted warplanes, and later Walt Disney Studios of Hollywood prepared an official Flying Tiger emblem. The blue-and-white identification of the Chinese Air Force was never really needed after that.

Training of the new units took place according to the concepts of fighter tactics for which Chennault became world famous. Especially revolutionary was his two-plane element as opposed to the commonly used Air Force three-plane element. In his two-plane element tactics, Chennault had a third plane fly top cover. Advantage was concentrated on double firepower which accounted for so many ½, ⅓, and ¼ victories being credited to the Flying Tigers. Chennault studied the Japanese first-line fighter, the Zero, and analyzed its superior performance in a dozen categories compared to the P-40's superiority in three categories. During training he stressed to his men the necessity of fighting the Zero on the P-40's most favorable points. He pointed out that if his men had the Zeros they could just as easily fight against the weaknesses of the P-40.

His pilots found the narrow landing gear of the P-40 especially troublesome when operated from hard earthen runways. Even the men who had had previous experience in the P-40 had "ground-loop" trouble and gear-retraction problems. Still, the Flying Tigers continued to train. Chennault wanted a crack outfit before he would send them into battle with the Japanese.

On December 7, 1941, the Japanese bombed Pearl Harbor and their activity against the Chinese Air Force was stepped up. On December 18 they bombed Kunming at a much higher level than had been used during the raids of the previous spring. The next day their formations struck again, but by this time Colonel Chennault was ready for them and the Flying Tigers came prepared to fight.

Gen. H. H. Arnold visited China, looked over Flying Tiger "hardware," chatted with General Chennault at base.

The radio warning net reported ten twin-engine Japanese bombers of the Mitsubishi 97 type climbing to great altitude out of Hanoi in the direction of the She-shan Mountains where Chennault's Kunming Field was located. Unaccustomed to air opposition, the Mitsubishis were unescorted by fighters. Chennault sent four planes of Jack Newkirk's Panda Bear Squadron to intercept the bombers, six other planes to cover the Tigers' home field, and fifteen planes of the Adam and Eve Squadron to cut off any enemy retreat. In this last group Bob Sandell led the six-plane assault formation and Bob Neale the four-plane support group with Bob Little leading the reserve ships. Newkirk's men sent the bombers hurrying for home and into the waiting guns of the Adam and Eve boys. Only four Jap bombers returned to their base at Hanoi. Fritz Wolf, formerly a dive-bomber pilot on the USS *Saratoga,* had the best tally that day with two confirmed Mitsubishis destroyed and one assist. Wolf's report reads:

"I attacked the outside bomber in the V. Diving down below him, I came up underneath, guns ready for the minute I could get in range. At 500 yards I let go with a quick burst from all my guns. I could see my bullets rip into the rear gunner. My plane bore in closer. At 100 yards I let go with a long burst that tore into the bomber's gas tanks and engine. A wing folded and the motor tore loose. Then the bomber exploded. I yanked back on the stick to get out of the way and went upstairs. . . . There I went after the inside man [of the Japanese bomber formation]. I came out of a dive and pulled up level with the bomber just behind his tail. I could see the rear gunner blazing away at me, but none of his bullets were hitting my plane. At fifty yards I let go with a long burst, concentrating on one motor. The same thing happened and I got No. 2. The bomber burned and then blew up."

A few days later, on December 23, the Japanese bombers attacked Rangoon, which was 1,000 miles from Chennault's Kunming headquarters, but he had his 3d Squadron, Hell's Angels, at Mingaladon Field to meet them. Six Japanese bombers and four Jap pursuit planes were shot down in that engagement, and the air war was on.

(Continued on following page)

Rangoon was the Burma port which served as the pouring end of the funnel for the supplies flowing up the Burma Road into China. Millions of dollars' worth of goods were centered and stored around this thriving port city. It was an important target, and the Japanese were determined to destroy it. On Christmas Day 1941, Chennault's early-warning system reported that a large force of over one hundred Japanese planes was headed toward Rangoon.

The 3d Pursuit Squadron rose to meet the attack. As the Japanese armada swept over—seventy bombers protected by a top cover of thirty-eight fighters—the eighteen Tomahawks of the Hell's Angels, led by Arvid Olson, screamed down out of the blinding sun, surprising and panicking the Japanese by the speed and fury of the attack. In the ensuing fight nine Japanese fighters and fifteen bombers crashed into the rice paddies, and without accomplishing their mission the armada fled for home. Along the way nine additional Japanese planes crashed. They were delayed victims of the fire-breathing tiger sharks.

The Tigers, near one of their famous shark-toothed craft, gather for a bull session with tough, beloved "Old Man."

The Hell's Angels switched locations with the Panda Bears, and on December 28, the 2d Pursuit Squadron met the next massive Japanese air assault on Rangoon, exchanging one Flying Tiger for eighteen Japanese planes.

In the next three months, Japanese planes were shot down at a ratio of twenty to one, with ninety-two Japanese airmen killed for every AVG pilot lost—a record never to be equaled. Chinese morale benefited greatly from the exploits of the Flying Tigers and they became endeared in the hearts of the Chinese people. To Madame Chiang Kai-shek, whom the boys had made the Honorary Commander of their group, they were "my angels, with or without wings."

In April 1942, Claire Chennault was recalled to active duty in the United States Army Air Corps and given the rank of temporary colonel, with permission to remain in his position with the Chinese government. A few weeks later he was promoted to the rank of brigadier general. In that same month Col. Robert L. Scott arrived in China to observe and later to take command of the 23d US Pursuit Group which was to be formed from the Flying Tiger unit—which formal transfer took place on July 4, 1942, when the American Volunteer Group was officially disbanded and replaced with the 23d. The official score of the AVG at that time was 299 Japanese planes destroyed in seven months and an equal number of probables (not confirmed victories).

Ten AVG pilots and one crew chief had been killed in action (four in air combat, six were hit by ground fire); nine pilots had been killed in accidents. The remaining Flying Tigers, with the exception of Chennault and five others (John Bright, Dave Hill, Ed Rector, Charles Sawyer, and Frank Schiel) returned to the United States where most of them later rejoined their Navy and Army Air Force units. "Pappy" Boyington and Jim Howard went on to fly their way to more victories, command positions, and Congressional Medals of Honor. The remaining five men formed the nucleus of the 23d Pursuit Group under Colonel Scott.

Claire Chennault assumed command of the China Air Task Force, which included the 23d Pursuit Group, the 16th Pursuit Group, and the 11th Bombardment Squadron (Medium). In March 1943, as a major general, Chennault was made the commander of the 14th Air Force which was formed out of the China Air Task Force.

Fresh young men from the AAF cadet schools poured into China to replace the old Flying Tigers and form the new units in America's growing Air Force. Of these men, General Chennault, in January 1944, wrote (in a letter to Gen. H. H. "Hap" Arnold, chief of the Army Air Force, in regard to the 14th Air Force's outstanding combat record): "It is indicative of what the American youngster with the fine training he has received under your careful guidance can accomplish in the vast country." The old pilots had held the enemy until the young Americans could pour through the flying schools to take over a tough job well done.

General Chennault continued his work with fighters and developed the most valuable tactical concept to come out of the war—low-level fighter bombing. He continued, as commander of the 14th Air Force, to perfect to a high degree his ideas of fighter-plane versatility. He conceived the plan for a fragmentation bomb, timed to go off at any altitude, to be carried by fighters to enable them to get above an enemy bomber formation and bomb them with a sort of upside-down flak. This technique was never developed to a precision point, although late in World War II it was feared that the Germans had nearly perfected a similar type weapon. Chennault was also able to watch an idea he had propounded early in 1932 become a useful realization: the paratrooper and the paradropping of artillery and other heavy equipment.

This man, who was known as the Old Man to the men who flew for him, and Old Leather Face to the Chinese people who loved him, was also dubbed Father of Aces for his brilliant leadership of the Flying Tigers, whose remarkable performances left a proud entry on the selective pages of aviation history.—END

ABOUT THE AUTHOR

Author Gene Gurney, a veteran of fifteen years in the Air Force, was commissioned a fighter pilot at nineteen, and received his Regular commission at twenty-one. After World War II, he was assigned to counterintelligence duty in Germany and performed a stint with OSI investigating gold smuggling in the Near East. Later, he was reassigned to SAC as a tanker pilot and is now stationed at Westover AFB, Mass. Since boyhood, he has been fascinated with air aces, an interest which led him to work on his Five Down and Glory. *Mark Friedlander, Jr., who edited* Five Down and Glory, *is a first lieutenant in the Air Force Reserve, and is now practicing law in Washington, D. C. He met author Gurney during his Air Force days, when they were both stationed at Turner AFB, Ga. There they joined forces on this work.*

Photographed at the Nassau Straw Market, one of the tourist attractions of the Bahamas.

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AFA NEWS

SQUADRON OF THE MONTH

The Oahu Squadron, Honolulu, T.H., Cited for

its sponsorship of the first Jet Age Conference to be held in the Pacific. Through lectures, films, and displays, the nature and importance of airpower were effectively demonstrated to the public.

November Hawaiian conferees are, from left: Roy Leffingwell, AFA Regional V-P; ANG's Maj. Gen. Winston P. Wilson; Mr. Ducander, House Committee Counsel; Maj. Gen. Fred Makinney, Hawaii Adjutant General; Lt. Col. James Ashford, 199th F-I Squadron (ANG) Commander; and Hawaii's Gov. William F. Quinn.

Kansas City's Mohawk Squadron is coming back to life with a rush in the wake of a visit there in September by AFA Board Chairman **John P. Henebry.** On December 7, a luncheon meeting at nearby Richards-Gebaur AFB attracted more than 400 community and base leaders, and more than half of them have already signed up as members of the Squadron.

Maj. Gen. Bernard A. Schriever, AF Ballistic Missile chief, came in from Los Angeles to deliver the principal address of the luncheon, which also featured remarks by **Maj. Gen. Jarred V. Crabb,** Central Air Defense Force Commander, and **James H. Straubel,** AFA's Executive Director, who outlined for the group some of AFA's past accomplishments and future objectives. General Crabb, who helped spark the reorganization of the Squadron, served as toastmaster.

The new Commander of the Mohawk Squadron is **A. J. Esrey,** General Manager for American Telephone & Telegraph. Other officers are **Richard Green** and **Francis J. Fitzpatrick,** Vice Commanders; **Kerwin Koerper,** Secretary; and **John Yonts,** Treasurer.

Plans are jelling for the **Utah Wing's third annual Airpower Symposium.** The Wing's two previous programs have been instrumental in winning the **President's Trophy** for the three Utah Squadrons in 1956 at New Orleans.

The 1958 edition of the Symposium will again be held in **Salt Lake City,** at the Hotel Utah, on **March 28-29.** It will open at noon on March 28 with a kick-off luncheon, continue with panel discussions that afternoon and the following morning and afternoon; will feature a luncheon and banquet on the twenty-ninth; and will wind up with the annual Airpower Ball that evening, at which the new Miss Airpower will be chosen. Last year more than 8,000 attended the last event, and the other events on the agenda were packed to capacity.

James R. Bonner, Ogden, is general chairman of this program, under the direction of Wing Commander **Dale Erickson.** The Salt Lake City Chamber of Commerce is a cosponsor. Guests expected include **AFA President Peter J. Schenk,** who will speak at the banquet on the twenty-ninth; **Gen. Edwin W. Rawlings,** Commander, Air Materiel Command; and **Arthur F. Kelly,** AFA Director and Past President. The theme of the Symposium is **"The Technological War—Key to United States Survival."**

Thirty-two distinguished Texans **from Dallas** were guests in December at **SAC Headquarters outside Omaha,** where they were given a briefing on SAC's mission, objectives, and problems. They were members of the **Dallas Airpower Council,** which is using such briefings to educate its membership. **Carr P. Collins, Jr.,** Dallas AFA Squadron Commander, ini-

A. J. Esrey, Mohawk Squadron Commander; Maj. Gen. Bernard Schriever, AF Ballistic Missile chief; AFA's James H. Straubel; and Maj. Gen. Jarred V. Crabb, Commander, Central Air Defense Force, discuss AFA plans before the luncheon meeting held in Kansas City in December ***(see text).***

Shown at recent Santa Monica Squadron meeting where two AFA awards were presented are John P. Henebry, AFA Board Chairman; Vince Barnett; Squadron Commander Gil Nettleton; and Jerry Fairbanks, producer of AFA's "Air Force Scrapbook" film. Barnett and Fairbanks received awards.

tiated the trip, and was in charge. **Eugene McElvaney,** Chairman of the Council, headed the list of SAC guests on the two-day tour.

Lt. Gen. Francis H. Griswold, SAC Vice Commander in Chief, (*see photo on page 95*), led the briefing teams. The Dallasites were enthusiastic in their praise of the SAC representatives, and were particularly impressed with their visit to the Command's underground control center.

Next on the list of programs for the Dallas area are a **Jet Age Conference,** tentatively planned for early spring; tours of other command headquarters; and luncheon and evening meetings featuring outstanding airpower speakers.

Continuing a practice initiated a couple of years ago, **Detroit** has once more spread out the welcome mat for a new Air Force commander, **Brig. Gen. C. T. Edwinson,** newly assigned Commander of the Air Defense Command's 30th Air Division, with headquarters at Selfridge AFB. The luncheon was held in the Sheraton-Cadillac Hotel, on December 12, and was attended by the press, area industry, military and AFA representatives

(Continued on page 95)

Left to right at Detroit Press luncheon are Terry Green, former AFA V-P; Brig. Gen. Lester Bork, US Army; D. Pippel, Ford Motor Co.; Cmdr. Donald Sanborn, US Navy; Brig. Gen. C. T. Edwinson, 30th AD CO; and Russell Lloyd, AFA Cmdr.

Los Angeles Group Awards dinner in December recognized area personalities for airpower contributions. Left to right are Brig. Gen. James Jackson, San Bernardino AMA; AFA's Earl McClintock; Clete Roberts, CBS-TV; Johnny Grant, Station KMPC; Dr. Martin Klein; and Maj. Gen. Sory Smith, 4th AF Commander.

Make Your Reservations Now for AFA's 1958 Convention in Dallas

Seven air-conditioned hotels have set aside 2,500 rooms and suites for the Air Force Association's 1958 Convention and Airpower Panorama in Dallas, Texas, September 25-28.

There will be three Headquarters Hotels, as follows:

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The major Convention events will be held in the new Memorial Auditorium, location of the Airpower Panorama. AFA business sessions will be held at the Adolphus Hotel; the Reserve Forces Seminar at the Baker; and the VIP Host Suite will be at the Statler Hilton.

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TRAVIS	5.00— 7.00	8.00— 9.00	8.00— 9.00	15.00 No 2-bedroom
WHITE-PLAZA	4.50— 8.50	6.00—10.00	6.00—12.00	15.00—27.00

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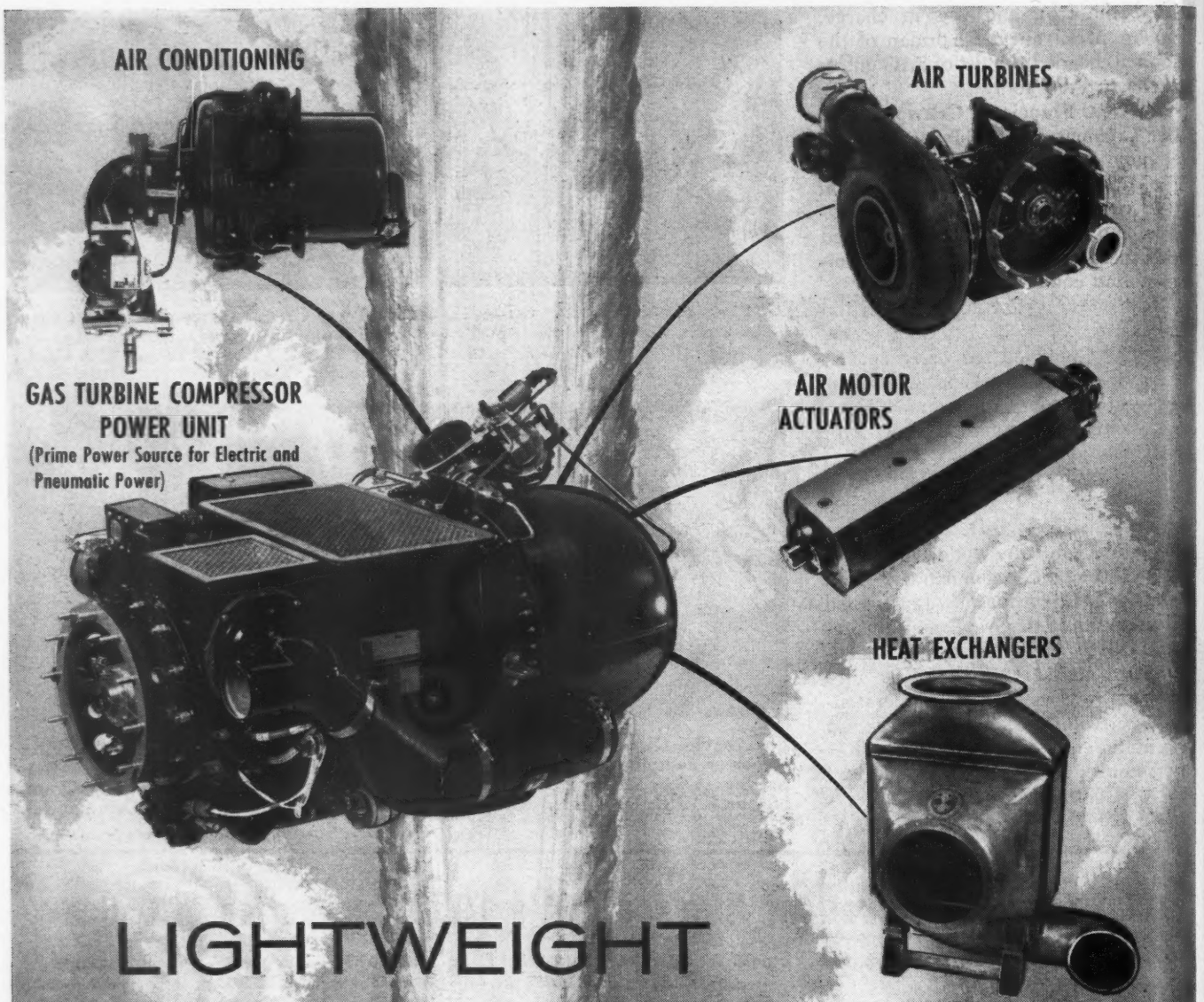

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Brig. Gen. Stanley Wray, WADC Commander; Calvin Johnson, Sperry Rand Corp.; Brig. Gen. Donald Hardy, Wright-Patterson AFB Commander; Brig. Gen. Charles Heim, Dayton AF Depot Commander; and AFA Squadron Commander Morris Ribbler are shown during AFA program welcoming new Air Force commanders to the Dayton area. The dinner was sponsored by the Wright Memorial Squadron in November.

Dallas Airpower Council members are briefed on SAC programs by Lt. Gen. Francis Griswold, SAC Vice Commander, during visit to Offutt AFB. Left to right are Dr. W. T. White, Dallas School District; Ralph B. Rogers, Texas Industries, Inc.; and Edmond L. Brown, Dallas investment counselor. They were part of group of thirty-two who made two-day trip from Texas.

led by **Russell Lloyd,** Vandenberg Squadron Commander. The **Ford Motor Company** sponsored the luncheon.

Dayton's Wright Memorial AFA Squadron, acting as "alumni hosts" to new Air Force commanders, welcomed three such new men to their area at a dinner November 1, at the Miami Hotel. The three new commanders are: **Brig. Gen. Stanley Wray,** Wright Air Development Center; **Brig. Gen. Donald L. Hardy,** Wright-Patterson AFB; and **Brig. Gen. Charles A. Heim,** Dayton AF Depot *(see cut).*

Calvin Johnson, former congressman from Illinois and now an official of the Sperry Rand Corporation, was principal speaker of the evening. **Jack Jenefsky,** Ohio Wing Commander, presented the three generals with citations naming them honorary Squadron members. **Glen Massman** served as toastmaster. The Squadron's Commander is **Morris Ribbler.**

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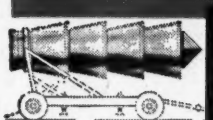
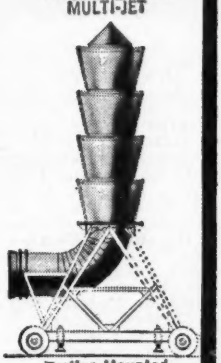
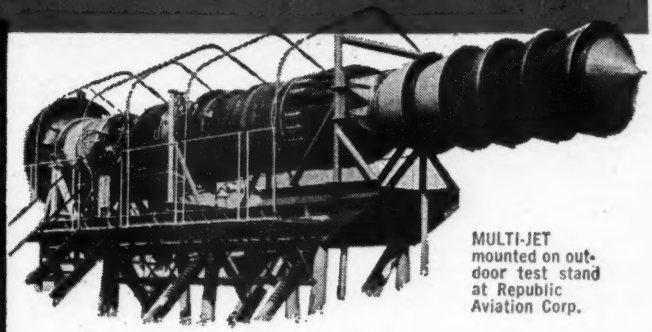


Trailer Mounted MULTI-JET (horizontal)

Nacelle Mounted MULTI-JET



Trailer Mounted MULTI-JET (vertical)



MULTI-JET mounted on outdoor test stand at Republic Aviation Corp.

IAC presents with pride the new MULTI-JET noise suppressor designed to meet diversified applications in the suppression of jet engine noise. Its extreme light weight (less than 400 lbs.) makes it ideal for field run-up operations on nacelle mounted jet engines such as those on military bombers and the forthcoming jet commercial air liners.

A Brochure describing the MULTI-JET silencer and performance data is available upon request.

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Formerly Aviation Division, Industrial Acoustics Co., Inc.

341 Jackson Avenue, New York 54, New York

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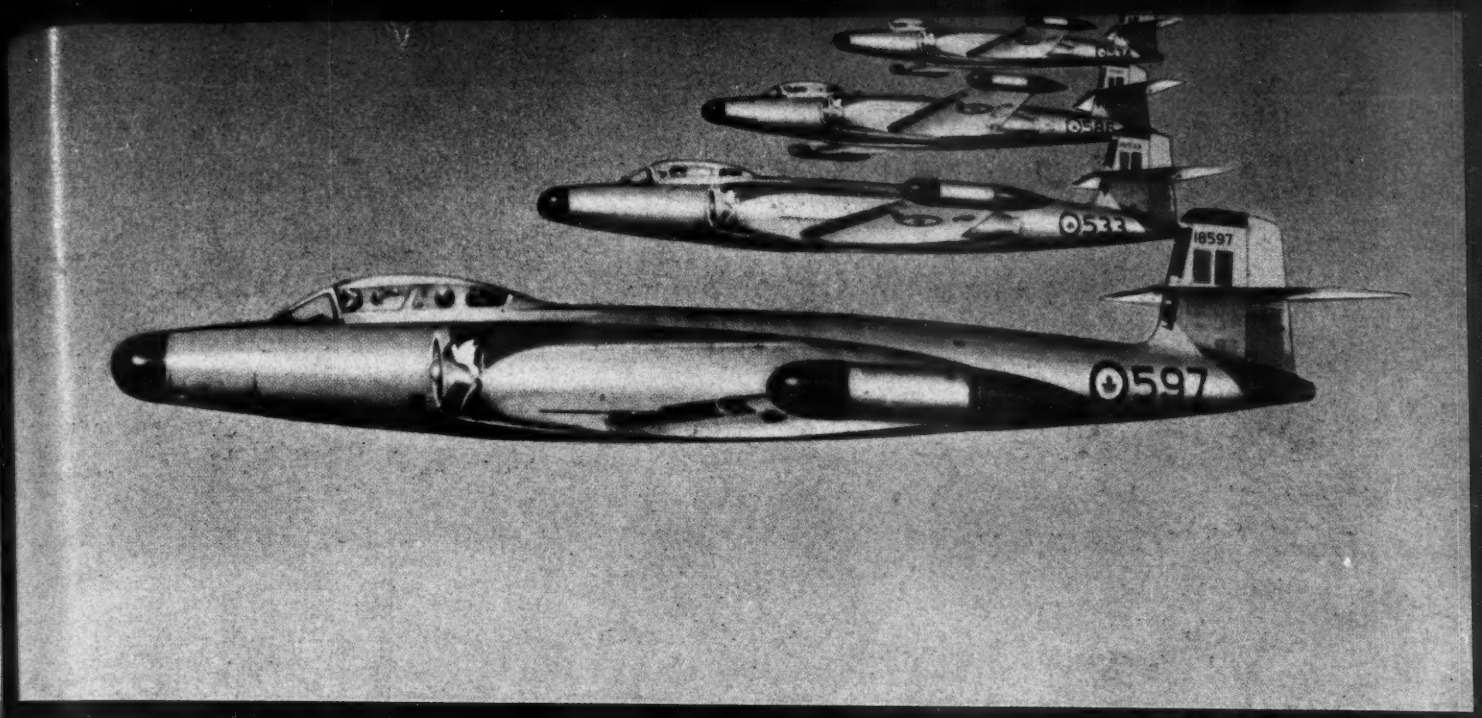

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